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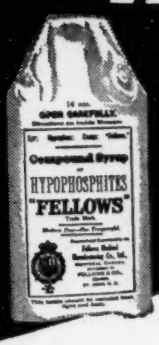

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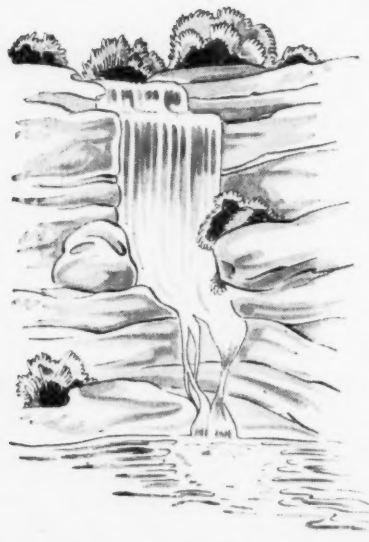

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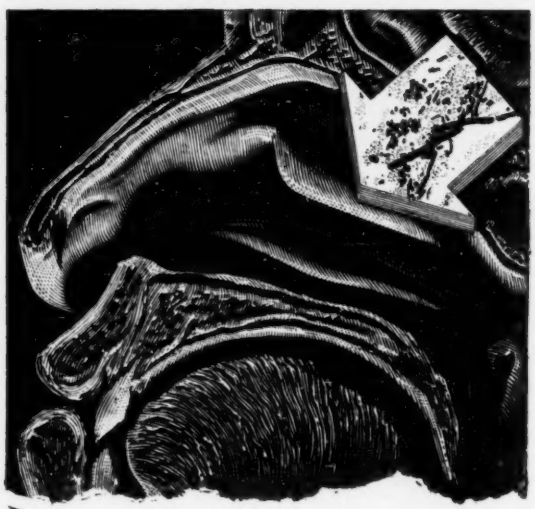

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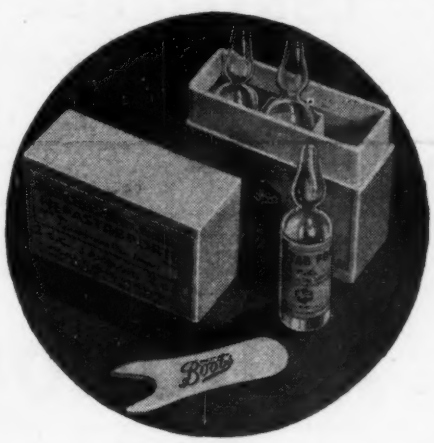

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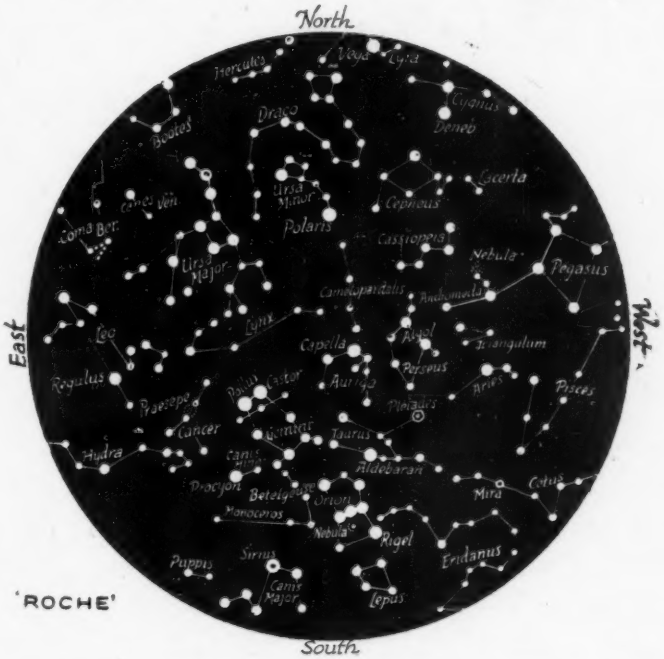

JANUARY

The Moon

The Moon is new on January 6th, first quarter January 13th. On the night of the 16th it passes through the southern part of the Hyades and close to the south of the Planet Saturn. It will be near to Jupiter on the evenings of the 19th and 20th, and is full on January 21st. Last quarter January 29th.

The Planets

Mercury is an evening star during the greater part of January. It will end the month as a morning star. Venus is an evening star near to the sun at the beginning of the month and then scarcely observable. By the end of the month it sets more than 1½ hours after the sun and is easily visible. Mars is a morning star and is comparatively a faint object. Jupiter moving westwards in Gemini as a morning star until the 11th, thereafter becomes an evening star. Saturn in Taurus and Uranus near the Pleiades are evening stars.

The chart shows the brighter stars above the horizon in the latitude of London at 12 midnight on January 1st at 10 o'clock on January 31st (Summer time). The stars are as they appear when chart is held above head.

From the above chart the Milky Way—that familiar, luminous galaxy of stars stretching across the heavens—has been omitted to provide better definition of constellations. In mythology it is, of course, described as the pathway of the gods.

It is a far cry from the contemplation of the Milky Way to a consideration of the hot-milk, bedtime drink. Yet wartime restrictions perforce direct attention to such mundane matters. In these days of shortage of milk and sugar, a change-over agreeable to the patient may be made to 'SEDOBROL.' A cup of this delicious sedative bouillon at bedtime is an acceptable and effective nightcap, and will be welcomed for these reasons:—

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TETANUS IN THE MIDDLE EAST
EFFECTS OF ACTIVE IMMUNISATION

J. S. K. BOYD
O B E, M B GLASG, D P H
COLONEL RAMC; DEPUTY DIRECTOR OF PATHOLOGY

J. D. MACLENNAN
M D ABERD
MAJOR RAMC; DEPUTY ASSISTANT DIRECTOR OF PATHOLOGY

Middle East Force

THIS report records the incidence of tetanus during the first 2 years of war in the Middle East, and attempts to assess the part played by active and passive immunisation in the prevention of this disease. Passive immunisation was fully tested in the war of 1914–18, and proved its worth by reducing the incidence of tetanus to under 1 case per 1000 wounded, but the present war is the first occasion on which active immunisation has been submitted to a practical trial.

PRINCIPLES IN TETANUS PREVENTION

Tetanus results from the action of the toxin of *Clostridium tetani* on the motor nerve-cells of the central nervous system. The organism is an anaerobic saprophyte found in the contents of the large intestine of some animals and in soil with which excrement from these is mixed. It forms highly resistant spores. In wounds with dead tissue or blood-clot in their depths, in areas of necrosis produced by foreign bodies, and in regions devitalised by an impoverished blood-supply, implanted spores germinate and multiply. Toxin produced by the vegetative forms finds its way into the body of the host and exercises its specific action on the motor nerve-cells. Since the bacillus lives in dead and not in living tissue, it is not directly subject to the action of the normal phagocytic processes.

Development of tetanus may be avoided by two distinct but complementary measures:

Surgical Treatment.—The potential focus of infection must be extirpated by removal of all dead tissue, blood-clot and foreign bodies from the wound. This helps to prevent gas gangrene as well as tetanus; but surgery alone will not prevent tetanus in every case.

Immunisation.—Any toxin formed before surgery can be carried out, or emanating from small infected pockets or inaccessible portions of dead tissue, must be neutralised by active and passive immunisation.

Active immunity is produced by inoculation with tetanus toxoid, formolised toxoid being used in the British Army. Two injections of 1 c.cm. are given at an interval of 6 weeks, and a third 6 months or more later. After the first inoculation no antitoxin appears in the circulation, but sensitisation, believed to be of the reticulo-endothelial system, develops over about 6 weeks. When the second inoculation is given after this interval, the toxoid stimulates the sensitised reticulo-endothelial system and produces an outpouring of antitoxin into the circulation. In most subjects this reaches a level ranging from 0·1 to 1 unit per c.cm. of serum after an interval of 10–12 days, and thereafter slowly declines. The sensitivity of the reticulo-endothelial system is maintained and apparently enhanced after the second inoculation, so that the third, given 6 months later, is followed by an antitoxin titre which normally rises to from 2 to 10 units per c.cm. of serum, and may reach an even higher level.

In an actively immunised subject suffering from a tetanus-infected wound the toxin may be regarded as neutralised in two phases. In the early stages the circulating antitoxin inactivates the first quantities of toxin coming from the wound. Meantime the "shadow-factory" in the reticulo-endothelial system is stimulated, and in due course quantities of antitoxin are released into the circulation, ready to reinforce the action of what pre-existing antitoxin remains.

The interval between stimulation of the reticulo-endothelial system and the production of antitoxin has thus an important bearing on the problem of active immunisation. In 1938 an experiment to determine this point was carried out, and gave the figures shown in table I. The 5 subjects were some of the RAMC personnel on whom the original experiments in immunisation at the Royal Army Medical College were made[1]; they had been inoculated with varying doses of different preparations.

It will be noted that antitoxin production begins about the 5th day, and reaches its peak somewhere between the 10th and 14th days. From these data, it has been concluded that in general active immunisation may be expected to afford protection against tetanus in all wounded men who receive adequate surgical treatment. There are, however, possibilities for which provision must be made:

1. The subject may not react to inoculation with toxoid. There is little direct evidence of this, but judging from other processes of immunisation occasional non-reactors are to be expected.

2. Although a subject is immunised, his circulating antitoxin may be small in quantity. There is thus a period of about a week when the barrier of protection is low, and liable to break down.

3. Antitoxin production may be less active in a badly wounded and shocked subject than it is in a normal healthy person.

Passive immunisation consists in introducing into the body a known quantity of preformed antitoxin. This neutralises toxin with which it comes in contact, and consequently becomes exhausted in proportion to the amount of toxin present. If not used up in this way it is slowly destroyed or excreted, so that the quantity remaining a fortnight after inoculation is too small to be of practical value. Repeated inoculations at weekly intervals are necessary to maintain a satisfactory antitoxin level. Antitoxin has no antibacterial properties, and acts solely by rendering toxin innocuous.

TABLE I—PRODUCTION OF TETANUS ANTITOXIN IN PREVIOUSLY IMMUNISED SUBJECTS, AFTER A DOSE OF 1 C.CM. OF TETANUS TOXOID

Recorded in USA units of antitoxin per c.cm. of serum

—	Date in 1938	Subjects				
		A	B	C	D	E
Initial antitoxin titre	Sept. 9	0·23	0·0065	0·0125	0·05	0·5
Tetanus toxoid 1 c.cm. given on Sept. 12; subsequent antitoxin titre	,, 13 (1)	0·23	0·0065	0·0125	0·05	0·5
	,, 14 (2)	0·23	0·0065	0·0125	0·05	0·5
	,, 15 (3)	0·25	0·010	0·0125	0·055	0·5
	,, 17 (5)	0·85	0·035	0·07	0·55	0·55
	,, 19 (7)	11·00	0·80	2·00	3·50	1·65
	,, 22 (10)	16·00	2·00	5·50	4·50	3·00
	,, 26 (14)	16·50	2·00	5·30	4·20	2·70
	Oct. 11 (30)	14·00	1·60	3·00	4·00	1·80

Figures in parentheses = number of days after inoculation.

ROUTINE PROPHYLAXIS

The following procedures, based on these principles, are now adopted as a routine in the Army.

Each man shortly after enlistment is inoculated with two doses of 1 c.cm. of tetanus toxoid at an interval of 6 weeks. After a further interval of at least 6 months a third dose of 1 c.cm. is given. Inoculation is on a voluntary basis, but as tetanus toxoid causes little or no reaction (except very rare anaphylactic reactions) it is seldom refused. The percentage inoculated with two doses is over 95% in most units, but up to date a much smaller percentage has received the more recently introduced third dose.

As soon as possible after an injury is inflicted, each wounded man is given a dose of 3000 international units of tetanus antitoxin (ATS). This is intended to cover any gaps in the protection afforded by active immunisation. Unfortunately in the rush of battle conditions this inoculation is occasionally omitted. Should the patient never have been actively immunised, he is given further doses of ATS at weekly intervals.

EXPOSURE TO INFECTION

Little is to be gleaned about the incidence of tetanus from the medical experiences of the BEF in France during 1939–40. There were few casualties until the end of that campaign, and it must be assumed that many of the more severely wounded, about whom nothing is known, were left behind. Bensted[2] gives such information as is available. It was estimated that about 90% of the BEF were inoculated with two doses of tetanus toxoid. In all, 8 cases of tetanus were reported, among

1. Boyd, J. S. K. *J. R. Army med. Cps*, 1938, **70**, 289.

2. Bensted, H. J. *J. R. Inst. pub. Hlth Hyg.* 1941. **4**, 7.

the unprotected 10%. No tetanus developed in the 90% who were actively immunised.

In the Middle East it has been possible to obtain records of most of the cases arising, and to study the relationship of the incidence to active and passive immunisation. The chances of acquiring tetanus in the Middle East are not comparable to those in France and Flanders. The sandy and arid soil of the desert is unsuited for the propagation of anaerobes, though quantities of the desiccated droppings of donkeys, ponies and camels are to be found scattered on the sand near the main tracks. An attempt has been made by the examination of samples of soil, and by making cultures from wounds other than those in cases in which tetanus develops, to assess the risk of acquiring tetanus infection in the Middle East.

TABLE II—SOIL SAMPLES FROM WHICH TETANUS BACILLI WERE CULTURED

—	Locality	Serological type
1	Dust blown in by sand storm, near Daba	III
2	Agricultural land, Barrani	V
3	Italian Camp, 4 km. west of Barrani	III
4	Tobruk-Benghazi road, 129 km. west of Tobruk	VII
5	Appolonia	II
6	Cultivated land, 10 km. west of Barce	I
7	Barce, hospital grounds	V
8	Benghazi, roadside	V

Soil samples taken from 91 different spots between Daba and Benghazi (including the Quattara Depression) have been examined for tetanus spores, with positive results in 8 cases (8·8%). In the samples taken between Daba and Tobruk, where the country is mainly desert, tetanus was found only 3 times in 60 samples. In the 31 samples taken from the more fertile land west of Tobruk, it was found in 5. Table II shows the locations from which the positive samples were taken, and the serological type of organism recovered. All these strains of *Cl. tetani* isolated from soil proved to be toxigenic.

Despite the relative rarity of tetanus bacilli in soil samples, they are by no means uncommon in wounds. A series of 214 wound cultures received from different hospitals has been examined for terminal-spored anaerobes. These cultures were taken from wounds of a severe type in which anaerobes were either known or suspected to be present, so that the series is a selected and not a representative one. In 63 of these cases gas gangrene was present or supervened. An analysis of the terminal-spored anaerobes found in these wounds is given in table III. It will be seen that *Cl. tetani* was found in 18 (8·4%).

In one hospital, from January, 1941, to July, 1942, wound swabs from a total of 494 cases were examined. One or more species of clostridium were found in 66, including 20 terminal-spored anaerobes. Of these, 2 were *Cl. tetani* (one type III, one type V). The commonness of terminal-spored bacilli in wounds is worthy of note. The laboratory often receives from the ward a swab accompanied by a request for an immediate report on the presence of *Cl. tetani*, and the surgeon is apt to be aggrieved when told that it will be some days before a definite reply can be given. Table III makes the reason obvious: it is not possible to give an opinion of any value on morphological appearances alone. The laboratory can afford no timely positive assistance in the diagnosis of tetanus, although it may ultimately provide confirmatory evidence. Early diagnosis must be based on clinical signs and symptoms.

In the period under review, 18 cases of clinical tetanus have been reported in the MEF. These include 1 case which was notified from Malta, but it is not known if any other cases have developed there. The principal data relating to incidence, prophylaxis, antitoxin therapy, and progress are shown in table IV.

United Kingdom, Australian, New Zealand, and Indian troops have been inoculated with tetanus toxoid, but this measure was not adopted for South African troops until comparatively recently. German troops were not immunised in the early stages of the campaign when these cases developed; and it is not known whether their practice has since changed. Italian troops may or may not have been immunised. Captured Italian medical stores included large quantities of a typhoid-paratyphoid vaccine in which tetanus toxoid, later proved to be potent, was embodied; on the other hand the inoculation state of Italian troops was found to be low.

In the British and Dominion Forces receiving routine inoculation a consecutive series of casualties included 4 cases of tetanus (2 in Maoris and 2 in Indians, 1 of whom had not been inoculated), and the incidence of the disease was 0·13 per 1000 wounded. Among the South Africans during the same period the incidence was 1·6 per 1000 wounded. There were 3 cases among an unknown but relatively small number of wounded Germans, 3 in Italians whose inoculation history is uncertain, and 1 in an Eritrean. Thus whereas the incidence of tetanus among the actively immunised troops was almost negligible, the number of cases reported in unprotected South African, German and Italian wounded was relatively high. Though the total number of cases is small the evidence in favour of active immunisation appears to be fairly definite.

TETANUS IN IMMUNISED SUBJECTS

Of the 18 cases of tetanus reported, 5 were in men who had been actively immunised, 4 with two doses, and 1 with three doses. One case, in which only a single dose had been given, is included in the non-immunised series. None of these 5 cases received the stipulated dose of 3000 units of ATS as a prophylactic measure after being wounded. Of these 5, 2—one a Maori, the other an Indian—recovered.

CASE 5.—This Maori received tetanus toxoid on March 11 and April 3, 1940. Wounded in Crete, May 21, 1941. Bullet through left forearm. No injury of bone. No ATS administered. Trismus and neck-rigidity appeared on June 3, 13 days after wounding. Not seriously ill. No generalised spasms. Given 40,000 units ATS intramuscularly and the same intrathecally on June 3. Same dosage repeated on June 4. Gradually improved and recovered. *Cl. tetani*, type VII, recovered from wound. *Chemotherapy:* no record.

CASE 15.—Indian. Only hearsay evidence of this case. Said to have developed tetanus after a gunshot wound, and to have recovered. Was not reported as tetanus, and when information came to light no further details could be given.

TABLE III—TERMINAL-SPORED ANAEROBES FOUND IN CULTURES FROM 214 WAR WOUNDS IN CASES WHICH DID NOT DEVELOP CLINICAL TETANUS

—	A	B	—	A	B
Cl. tetani type I	2	1	*Cl. cochlearium*	6	3
,, ,, ,, III	3	1	*Cl. hastiforme*	2	1
,, ,, ,, IV	1	..	*Cl. capitovale*	4	2
,, ,, ,, V	3	2	*Cl. tertium*	20	13
,, ,, ,, VI	1	..	*Cl. sphenoides*	3	2
,, ,, ,, VII	1	3	*Cl. tetanomorphum*	..	1
Cl. putrificum	9	8	Unidentified	1	..

A=gas gangrene (63 cases). 52 strains of terminal-spored anaerobes were isolated.
B=wounds not complicated by gas gangrene (151 cases). 65 contained anaerobic bacilli; 37 were terminal-spored anaerobes.

Of the 5 actively immunised cases 3 were fatal Case 7, the first of these, has been reported in detail by Major R. J. McGill; the following is an extract of his notes.

CASE 7.—Indian. Tetanus toxoid, April 25 and June 7, 1941. Not a battle casualty. No prophylactic antitoxin administered. About Oct. 21, while stationed on the Red Sea littoral, cut his hand. Dec. 2, stiffness of dorsal thoracic muscles and back of neck, 42 days after wounding. Dec. 4, admitted to hospital. Had completely healed wound on left thenar eminence and one on palmar surface of left middle finger, each about ¾ in. long. Moderate risus sardonicus and trismus, the jaws opening ¼ in. Much stiffness of the back and neck. Abdominal muscles rigid, but moved with respiration. Paroxysms of opisthotonus regularly every ½ min., lasting about 5 sec., accompanied by clenching of the jaws and spasm of the thoracic and abdominal muscles. Limbs unaffected. Dec. 5, spasms only once a minute. Dec. 6, spasms every 2 min., much less severe. Dec. 7, died suddenly.

Treatment: about 30,000 units ATS before admission to hospital and 80,000 units daily while in hospital.

TABLE IV—FINDINGS IN 18 CASES OF TETANUS IN THE MEF

Case	Locality	Nationality	If actively immunised	Date of wounding	Prophylactic ATS	Date of onset of tetanus	Incubation period (days)	Dosage of therapeutic ATS (IU)	Result	Duration of symptoms in fatal cases (days)	Type of organism isolated
1	Western Desert	Ital. pw	?	?	?	Jan. 13, 1941	?	50,000	D Jan. 13, 1941	5–24	V
2	,,	Ital. pw	?	Jan. 3, 1941	?	Jan. 15	12	117,000	R	..	III
3	,,	Ital. pw	?	..	?	..	..	..	D	?	I
4	Eritrea	Eritrean pw	?	?	?	?	3	Given dose unknown	R	..	No culture
5	Crete	NZ (Maori)	2 doses	May 21	Nil	June 3	13	160,000	R	..	VII
6	Western Desert	German pw	Nil	June 16	June 16, 1941	July 9	23	90,000	D Sept. 9	88	V
7	Red Sea • littoral	Indian	2 doses	Oct 21	Nil	Dec. 2	42	307,000	D Dec. 7	6	No culture
8	Western Desert	South Afr.	Nil	Nov. 23	Nil	Dec. 8	15	400,000	R	..	V
9	,,	German pw	Nil	Nov. 24	Nov. 26	Dec. 10	16	50,000	D Dec. 11	2	No culture
10	,,	German pw	Nil	Nov. 29	Nil	Dec. 16	17	60,000	D Dec. 20	4	V
11	,,	Indian	Nil	Dec. 6	Nil	Dec. 18	12	117,000	R	..	No culture
12	,,	South Afr.	Nil	Dec. 12	Dec. 19	Dec. 21	8	240,000	D Dec. 23	3	No culture
13	,,	South Afr.	Nil	Nov. 27	Nil	Dec. 24	27	260,000	R	..	VII
14	,,	South Afr.	Nil	Jan. 18, 1942	Nil	Feb. 14 1942	27	600,000	R	..	No culture
15	,,	Indian	2 doses	..	?	..	..	..	R	..	No culture
16	,,	South Afr.	1 dose Mar. 11, 1942	June 28	Nil	July 6	8	522,000	R	..	New type toxigenic
17	Malta	UK	2 doses	June 23	Nil	June 28	5	320,000	D June 29, 1942	1	No culture
18	Western Desert	NZ (Maori)	3 doses	July 14	Nil	July 22	9	150,000	D July 24	1	III

• Not a battle casualty. D = death. R = recovery. pw = prisoner of war.

Autopsy: left heart comparatively empty, right heart engorged, rupture of one pulmonary cusp, passive congestion of viscera. No culture obtained. *Chemotherapy:* none.

This case presents several peculiar features. (*a*) The only lesions to which the infection could be attributed were two small, superficial, and completely healed wounds of the hand. Unfortunately no cultures or sections were made. (*b*) The interval between wounding and the onset of symptoms was 6 weeks, and he died in 5 days. (*c*) The symptoms were unusual: short spasms lasting about 5 sec. at regular intervals of ¼ min. to begin with, later of about 2 min. (*d*) While the tetanic condition was improving, death resulted apparently from the rupture of a pulmonary cusp, a most exceptional and inexplicable event.

The possibility of some alternative diagnosis has been carefully considered. Rabies can be excluded by the symptomatology and the remaining condition to be considered seems to be some form of poisoning. Prof. J. A. Gunn considers that in spite of the atypical features, tetanus remains the most probable diagnosis in this case. Accepting it as one of true tetanus, and the wounds described as the seat of infection, then the focus from which the toxin was evolved was a small one (compare cases 17 and 18) and, as the wounds were healed, the interval between the elaboration of the toxin and the appearance of symptoms must have been considerable. According to the patient's documents, he was inoculated with two doses of tetanus toxoid some 6 months before the onset of his illness. Had this inoculation resulted in sensitisation of the reticulo-endothelial system, the stimulus afforded by the tetanus toxin elaborated in the wound would, in normal conditions, have led to the production of antitoxin from the 5th day onwards, which, by the time symptoms developed, would have reached a high level (see table I). In cases where toxin production is massive (cases 17 and 18) it is easy to conceive that antitoxin production may be inadequate to neutralise it: but in this case there is nothing to suggest excessive toxin formation. If inoculation was carried out as recorded—and there is no reason to doubt it—it seems reasonable to conclude that this is one of the rare instances in which the subject has *not* responded to immunisation.

CASE 17.—A gunner at Malta. Tetanus toxoid 1 c.cm. Aug. 23 and Oct. 8, 1940. On June 23, 1942, large wound soft tissues of heel plus comminuted fracture both bones of leg at junction of lower and middle thirds. Wounds excised, sutured, put up in plaster. No ATS given. June 28, 5 days after wounding: difficulty in swallowing, trismus; later, neck rigidity. June 29, stiffness and retraction more pronounced. Plaster removed: soft tissues necrotic, foul pus in wound, and at site of fracture: amputation through fracture. Developed respiratory spasm, condition rapidly deteriorated, died.

Treatment with ATS: June 28, 80,000 units intramuscularly, in two doses. June 29, 40,000 units intramuscularly, 200,000 units intravenously. *Chemotherapy:* no record. No culture taken.

CASE 18.—New Zealander, Maori. Tetanus toxoid Jan. 12 and Feb. 26, 1941, and April 13, 1942. July 14, reported sick, with temperature. Later wounded by shrapnel in left arm. No ATS given. Evacuated via casualty-clearing station to a general hospital. Temperature at one stage 103° F. July 18, operated on. Large foreign body removed from arm. Wound dressed with sulphonamide vaseline. July 19, given 8 g. sulphonamide. July 20, transferred to another hospital. Wounds looked clean, arm in sling; noisy and excited. July 21, again noisy and irritable. Left arm swollen and painful, condition suggestive of cellulitis. Wounds explored with sinus forceps, no frank pus. July 22, attempted to hit anyone who came near him. Foments applied to left arm. July 23, more excited, got out of bed and tried to hit another patient. Complained of pain in chest. Slight twitching of the arm noticed. T. 102° F. July 24, mild tonic spasms began which increased during day. At 7 PM temperature had risen to 107°. Died at 7.45.

Treatment: ATS on July 24 at 4.30 PM, 60,000 units partly intravenously partly intramuscularly; at 6 PM 90,000 units intramuscularly.

Autopsy: left forearm and arm greatly swollen; two large wounds on posterolateral aspect of left arm with superficial healing; spiral fracture of middle third of humerus, and all deep muscles showed extensive necrosis, almost colliquative; no actual pus or gas present; liver and kidneys showed toxic changes. Portions of muscle from the upper and lower ends of triceps, and the deep surface of the trapezius, and a portion of bone-marrow from the humerus all yielded a growth of *Cl. tetani*, type III. Other anaerobes were present, but have not yet been identified.

Cases 17 and 18, apparent failures of active immunisation, fall into a different category from case 7. Both have in common the presence of a mass of necrotic tissue, in which there was ample opportunity for the tetanus bacillus to flourish freely and to produce large quantities of toxin. In neither was there evidence of an active pyogenic process to draw attention to the fact that the wound required immediate surgical intervention. In case 17 primary suture was carried out and progress was normal until tetanic symptoms appeared. Removal of the plaster showed the presence of necrosis of the soft tissues with foul pus. In case 18 the peculiar mental reactions of the patient made adequate examination difficult. Even so, exploration

of the wound with sinus forceps failed to reveal frank pus on July 21, and at autopsy on July 24, though the arm was found to be much swollen with extensive necrosis of all the deep muscles, there was neither pus nor gas. In both cases, then, conditions were ideal for the massive production of tetanus toxin, and it is reasonable to assume that it was manufactured on a scale which far outpaced the antitoxin production of the patient's reticulo-endothelial system.

The interval which elapsed between wounding and the appearance of symptoms in these two cases is significant. Case 17 had two doses of toxoid 20 months before he was wounded. If his reaction was normal, he probably had an average but not a large amount of free antitoxin in his circulation, and a shadow-factory ready to come into production when stimulated. However, the facilities for toxin production in the wound were such that sufficient was elaborated not only to overcome the barrier of the free antitoxin, but to result in the onset of symptoms on the 5th day with a fatal termination 36 hours later (i.e. before his defence mechanism could come into action). Case 18 received two doses of tetanus toxoid at the beginning of 1941, and a third dose in April, 1942, 3 months before he was wounded. It is therefore to be expected that the level of his circulating antitoxin would be high, and that the response of his defence mechanism would be good. There can be little doubt that such was the case. Despite the fact that tetanus infection was widespread throughout the left upper arm and shoulder, so that toxin production must have been on a very extensive scale, symptoms did not appear until the 9th day. The most probable explanation is that the antitoxin barrier was so high that for a time it sufficed to stem even this exceptionally intense invasion. Ultimately, however, a stage was reached when toxin dominated and symptoms ensued.

TETANUS IN NON-IMMUNISED SUBJECTS

Of the 18 cases, 13 were in the non-immunised series. Of these 13, one received a single dose of 1 c.cm. of tetanus toxoid 3½ months before he was wounded; 3 others were Italian prisoners and 1 an Eritrean prisoner, regarding whose inoculation history nothing is known; 6 cases were fatal, so that the mortality rate was less than 50%.

Information about the interval which elapsed between wounding and the appearance of symptoms is lacking in 2 of the fatal cases. The average for the remaining 4 is 16 days; 3 of these received prophylactic ATS, 1 did not; the interval in the last was 17 days. In the 7 non-fatal cases, the average interval was 14·9 days. None of these seems to have received any prophylactic ATS, though it was possibly given without being recorded. The numbers are too small to be significant, but the general tendency towards a long incubation period is interesting. It cannot be attributed to antitoxin treatment, but may in some way be related to effective surgical treatment resulting in the removal of all but the most trivial foci of infection.

CASE 1.—Italian prisoner. History of active immunisation unknown. Date of wounding unknown. Small wound 1·5 cm. in diameter above right knee. No muscle involvement. No record of prophylactic ATS. Jan 13, 1941, onset of generalised tetanic spasms which quickly became violent; died 5½ hours after onset.

Treatment: ATS 50,000 units intramuscularly. *Cl. tetani*, type V, cultured from wound. *Chemotherapy:* no record.

CASE 2.—Italian prisoner. History of active immunisation unknown. Jan. 3, 1941, shrapnel wounds of outer aspect of left thigh, involving muscle. Dressed with sulphapyridine and eusol. No record of prophylactic ATS. Jan. 15, stiffness of jaw, neck and back, 12 days after wounding. Jan. 19, generalised spasm. Jan. 21, last generalised spasm. Recovered.

Treatment with ATS: received 117,000 units, including Jan. 18, 40,000 units intramuscularly, 4000 units intrathecally; Jan. 19, 15,000 units; Jan. 26, 20,000 units; Feb. 3, 20,000 units, all intramuscularly. *Cl. tetani*, type III, isolated from wound. *Chemotherapy:* only as noted.

CASE 3.—Italian prisoner. No record of this case, other than a culture with a serial number, and a statement that the patient had died with the symptoms of tetanus. Attempts to obtain further information unavailing. *Cl. tetani*, type I, grown from culture.

CASE 4.—Eritrean prisoner. No definite history of active immunisation; unlikely. Wounded in right thigh. Admitted hospital 28 days later with healing ulcer 6 cm. across and small sinus going down to muscle. Had flexion deformity and was manipulated under an anæsthetic; 3 days later developed stiffness of jaw and had a mild convulsion. Given ATS (dose not stated) and recovered without further symptoms. Organisms morphologically resembling *Cl. tetani* cultured from sinus. No other details available. *Chemotherapy:* no record.

CASE 6.—German prisoner. Not actively immunised. Wounded probably June 16, 1941. Given ATS 3000 units. Admitted base hospital June 21 with infected foul-smelling sucking wound over right shoulder. Slow progress. July 9, tonic spasms of left thigh muscles 23 days after wounding. July 10, worse, with severe clonic spasm of great severity lasting 2–3 sec. Attributed to salt loss and treated accordingly. July 11, much the same. July 14, still cramps, left knee now completely flexed. Aug. 1, leg less flexed, now could be extended almost completely. Possibility of symptoms being due to upper motor neuron lesions considered. Aug. 10, general condition much improved. Aug. 30, further operation on thorax. Large foreign body removed from posterior wall. Sept. 6, return of cramp-like pains in legs. Thigh muscles in spasms. Pain behind angles of jaw. Sept. 8, definite trismus; 90,000 units ATS given (route not specified). Sept. 9, died. *Cl. tetani*, type V, recovered from wound. *Chemotherapy:* sulphapyridine 1 g. three times daily from June 27 for an unspecified period.

CASE 8.—South African. Not actively immunised. Wounded Nov. 23, 1941. Multiple gunshot wounds, thigh and genitalia. No prophylactic ATS. Trismus appeared Dec. 8, 15 days after wounding. Progressed until Dec. 15, masseters, neck muscles, back muscles and rectus abdominis all spastic. No tetanic convulsions. Improvement started Dec. 17. Recovered.

Treatment with ATS: received a total of 400,000 units, including Dec. 11, 3000 units subcutaneously and 40,000 units intramuscularly; Dec. 12, 200,000 units intravenously; Dec. 14, 20,000 units intramuscularly. *Cl. tetani*, type V, isolated from culture. *Chemotherapy:* sulphanilamide 4 g. on Nov. 24; 1 g. on Nov. 30 and Dec. 1. Sulphapyridine 1 g. on Dec. 10.

CASE 9.—German prisoner. Not actively immunised. Wounded buttock Nov. 24; 3000 units ATS given on Nov. 26. Symptoms appeared Dec. 10, after interval of 16 days. Trismus going on to generalised spasm; 50,000 units ATS given on Dec. 10. Died Dec. 11. No culture taken. *Chemotherapy:* no record.

CASE 10.—German prisoner. Not actively immunised. Wounded Nov. 29 in right leg half-way between knee and ankle. No record of prophylactic ATS. Nov. 31, leg amputated. Dec. 16, symptoms of tetanus appeared, after interval of 17 days; 60,000 units ATS given. Dec. 20, died. *Cl. tetani*, type V, isolated from culture. *Chemotherapy:* no record.

CASE 11.—Indian. Not actively immunised. Dec. 6, 1941, bomb wound right ankle. No ATS given. Dec. 13, foot amputated. Dec. 18, trismus developed, 12 days after wounding. ATS 117,000 units given. Dec. 24, symptoms passed off. No culture taken. *Chemotherapy:* no record.

CASE 12.—South African. Not actively immunised. Dec. 12, 1941, gunshot wound of buttock with moderate laceration of muscle. Dec. 13, superficial excision. Dec. 19 (a week after wounding), ATS 3000 units. Dec. 20, slight spasms of affected limbs, 8 days after wounding. Dec. 22, wide excision and drainage. Gradually developed generalised spasms and opisthotonus. Dec. 23, died.

Treatment with ATS: Dec. 21, 80,000 units intramuscularly and intravenously; Dec. 22, 80,000 units intravenously; Dec. 23, 80,000 units intravenously. No culture taken. *Chemotherapy:* sulphonamide powder locally.

CASE 13.—South African. Not actively immunised. Nov. 27, 1941, wounded in right wrist, shoulder and both legs. No record of prophylactic ATS. Dec. 24, developed stiffness of ankle and recurring spasm of leg muscles. Dec. 28, typical tetanic spasm lasting 3½ min., with risus sardonicus and opisthotonus. Two further shorter spasms. Local spasms gradually disappeared. Recovered.

Treatment with ATS: Dec. 28, 60,000 units, intravenously; Dec. 29, 200,000 units intravenously. *Cl. tetani*, type VII, isolated in culture. *Chemotherapy:* no record.

CASE 14.—South African. Not actively immunised. Jan. 18, 1942, gunshot wound inner side left thigh. No prophylactic ATS. Jan. 18 and 26: surgical intervention. Feb. 14, 27 days after wounding, onset of tetanic spasms, which became generalised.

Treatment: Feb. 15 and 18, 200,000 units ATS intravenously on each day. Total amount given, 600,000 units. Steady progress to recovery. No material submitted for culture. *Chemotherapy:* prophylactic sulphonamide "by mouth and powder into the wound." No further details.

CASE 16.—South African. Tetanus toxoid, 1 c.cm. March 11, 1942. June 28, bomb wound left calf, much destruction of muscle. No record of prophylactic ATS. July 1, after debridement wound treated with sulphanilamide powder. July 6, 8 days after wounding, developed recurring spasms of calf every 15–20 min., trismus, and risus sardonicus. Opisthotonus and violent spasms of back after ATS. Wound curetted and again treated with sulphanilamide powder. Tetanic spasms continued but became less severe, all symptoms finally disappearing on July 15.

Treatment with ATS: July 6, 15,000 units intrathecally, 15,000 units intramuscularly, and 12,000 units intravenously; later 60,000 units intravenously, and tetanus toxoid 1 c.cm. July 7–16, 420,000 units ATS intravenously. *Chemotherapy:* local treatment as above. From July 7, course of sulphapyridine given, exact dosage not recorded. *Cl. tetani*, toxigenic strain, grown from wound. This appears to be a new type.

In case 16 symptoms developed within 8 days of wounding. Since a single dose of toxoid produced no circulating antitoxin, the dose given can have had no influence in preventing the onset of the disease. There is nothing to be gained by giving tetanus toxoid to a patient in whom symptoms of tetanus have already appeared; the toxin from the wound should already have provided the stimulus.

As far as these cases are concerned, the effect of chemotherapy as a prophylactic measure can be dismissed in a sentence. In none of them is there any record that the standard course of treatment, or in fact any adequate quantity of the sulphonamide drugs, has been given; so that no conclusions for or against their use can be drawn.

DISCUSSION

The evidence presented in this report indicates the value of active immunisation against tetanus, but the fact that 5 cases developed in inoculated men shows that this measure has its limitations. A study of these 5 cases brings out two possible causes of failure. The first—lack of response to immunisation—may possibly be overcome by the third dose of toxoid which is now being given. In addition to this, the more lightly infected cases are likely to receive adequate passive protection from the single dose of antitoxin which is recommended. The second cause of failure—massive and fulminating infection—introduces another factor. In cases 17 and 18 immunisation may or may not have been successful, but in both there is evidence to suggest that the focus of infection was so extensive that toxin was formed rapidly and in sufficient quantity to outpace the antitoxin production of the defence mechanism. It seems probable, particularly in case 18, that the outcome would have been the same irrespective of the state of immunity of the patient.

The lesson to be drawn from these 2 cases is clear. The protection afforded by active immunisation has its "ceiling." It appears capable of inactivating toxin from a wound which has received adequate surgical attention and from which the bulk of necrotic tissue has been removed. It is *not* capable of neutralising the massive quantities of toxin formed in extensive areas of necrotic tissue. Careful surgical treatment with removal of all dead tissue is therefore an important factor in preventing the onset of tetanus. This is a point which is liable to be overlooked from the theoretical standpoint, though in practice it has not been neglected, since it forms part of the routine treatment of all wounds as a preventive against the more common condition, gas gangrene.

Case 17 shows that the closed plaster technique is not without its dangers in the exceptional case. In this patient the presence of a mass of necrotic tissue was unsuspected until symptoms supervened, when it was too late for him to benefit from its removal. This report relates to a country in which the risk of tetanus is relatively low. It still remains to be seen if active immunisation is capable of combating the heavy infections likely to be incurred in such places as France or Flanders.

SUMMARY

The chances of becoming infected with tetanus in the Middle East, and particularly in the Western Desert, are much less than those in France and Flanders. Nevertheless, they are greater than might be expected, as can be seen from the presence of tetanus spores in soil samples, and tetanus bacilli in wounds.

In the first two years of war in the Middle East 18 cases of tetanus were reported.

The distribution of cases among inoculated and uninoculated troops affords evidence of the value of active immunisation. Nevertheless 5 cases, 3 of them fatal, developed in inoculated men. The protection afforded by active immunisation therefore has its limitations.

In one of these fatal cases, there seems to have been little or no response to immunisation with two doses of toxoid. This emphasises the necessity for giving a third dose of toxoid, and for heightening the barrier by giving a dose of antitoxin after the man is wounded.

In the other 2 fatal inoculated cases failure can be attributed to overwhelming infection resulting from the presence of masses of necrotic tissue in the wound. This indicates that the immunity afforded by inoculation with tetanus toxoid has its "ceiling," and that adequate surgery is an essential complementary part of the preventive treatment of tetanus.

We wish to thank the various surgeons and pathologists in the Middle East Force who have supplied data, and provided cultures from the wounds; and Mr. A. T. Glenny of the Wellcome Physiological Research Laboratories who carried out the titrations in the experiments recorded in table I.

LONG INCUBATION PERIOD OF SYPHILIS AND AN ELUSIVE PRIMARY SORE

MARY MICHAEL-SHAW, MB LOND

DIRECTOR, VD DEPARTMENT, ROYAL FREE HOSPITAL; MEDICAL OFFICER, VD DEPARTMENT, MOTHERS' HOSPITAL

THE following two cases seem worth reporting now when many contacts of patients proved to be suffering from venereal disease are presenting themselves for examination.

CASE 1.—A married woman, aged 24, came for examination on Jan. 29, 1942, having heard from her husband that he was in a military hospital suffering from early primary syphilis (the latter fact was confirmed). Intercourse had taken place 6 days previously and the husband had worn a sheath. The only clinical finding was that glands were palpable in the groins, but the patient was of the thin type in whom these glands can not uncommonly be felt. Wassermann and Kahn tests were negative as were smears and cultures from urethra and cervix for gonococci. The patient was asked to return in 4 weeks' time or before if she noticed anything wrong.

She came back on Feb. 26. Again there was no clinical evidence of infection and Wassermann and Kahn tests were again negative. Similar advice was given and the patient returned on April 1, and again on April 23, with the same negative results. By the time the Wassermann of the 23rd was reported on she had been under observation for nearly 13 weeks, and in view of this and the history of her husband having worn a sheath she was discharged.

Three weeks later, on May 20, she returned complaining of "spots" on the vulva. Two small sores were found on the left labium majus; unfortunately no scraping was taken but Wassermann and Kahn tests were returned positive and these were repeated after an initial arsenic injection and again were positive. There had been no exposure to infection since marital intercourse on Jan. 23; the patient was coöperative and intelligent; she had originally been informed as to early signs. Even if these sores appeared directly after her last examination one must conclude that the incubation period was some 90–110 days.

CASE 2.—A married woman, aged 28, came for examination on Aug. 3, 1942, because her husband had been admitted to a military hospital on Aug. 4 with early primary syphilis. The

patient had douched that morning and there were no clinical findings except for palpable glands in the groin. All pathological tests were negative for gonorrhœa and syphilis and the patient returned in 5 days to hear these results and for further examination. She was then found to have a thin frothy discharge due to *Trichomonas vaginalis*; smears, cultures, Wassermann and Kahn were again negative. Antiseptics were withheld and only palliative treatment for the trichomonas infection advised. Further examinations and blood tests were carried out Aug. 20 and Sept. 10; no clinical evidence of syphilis was found and Wassermann and Kahn tests were again negative.

The patient returned on Oct. 15. Externally there was no sign of infection, and a speculum was passed to examine vagina and cervix. After swabbing the cervix was clear and uninflamed but a minute cream-coloured spot at one edge of the speculum was seen. The first thought was that a wisp of cotton-wool had been left behind after swabbing, but on slightly withdrawing the Ferguson speculum the "wisp" became one corner of a somewhat triangular ulcer high on the lateral wall of the left fornix. The speculum was removed but digital examination only with difficulty detected the ulcer and a satisfactory view was only obtained by using a bivalve speculum. Clinically the ulcer was syphilitic: a scraping showed *Spirochæta pallida* and blood tests were returned positive.

These two cases illustrate the ease with which early syphilis can go undetected even when being searched for. In the first the difficulty arose from the long incubation period coupled with the minor fact of a sheath having been used during intercourse; in the second from the unusual position of the primary sore in the lateral fornix.

ZINC PEROXIDE, PROFLAVINE AND PENICILLIN IN EXPERIMENTAL CL. WELCHII INFECTIONS

JAMES MCINTOSH
M D, LLD ABERD
PROFESSOR OF PATHOLOGY IN THE UNIVERSITY OF LONDON

F. R. SELBIE
M D ABERD
ASSISTANT PATHOLOGIST AT THE BLAND-SUTTON INSTITUTE

(From the laboratory at the Bland-Sutton Institute of Pathology, Middlesex Hospital, and the Central Pathology Laboratory, EMS, Sector V)

EVEN with the most up-to-date treatment (surgery, serum therapy and chemotherapy) gas gangrene remains a serious complication of battle and air-raid wounds on account of its high fatality (30%–50%). The rapidity with which the disease can develop in torn and lacerated muscles makes preventive treatment difficult, and this is particularly the case with *Clostridium welchii*, the commonest cause of gas gangrene in Western Europe. We are now trying to find out the most suitable chemotherapeutic and specific treatment immediately after wounding. We have already shown that the sulphonamides are of value in preventing the development of gas gangrene in mice when administered locally in large quantities and soon after infection (McIntosh and Selbie 1941). Several publications, notably those of Hawking (1941) and Reed and Orr (1941) have supported our findings. Other further studies include investigations on the action of zinc peroxide, proflavine, penicillin and gramicidin on *Cl. welchii* infection.

MATERIAL AND METHODS

The strain of *Cl. welchii* and the methods used were the same as in our previous experiments except that bacterial suspensions for infection were prepared from 18-hour anaerobic cultures in 4% Difco proteose-peptone in distilled water. With this medium it was possible to obtain highly virulent cultures with much greater regularity than with Robinson's meat broth. Throughout the experiments we found that the intramuscular injection in the right thigh of 0·1 c.cm. of a washed suspension containing 2000 or 4000 million *Cl. welchii* and 0·1 c.cm. of 5% calcium chloride was sufficient to kill all untreated mice within 24 hours. This dose has usually been equivalent to at least 100 lethal doses and is therefore a severe test of preventive and therapeutic measures. It will become evident, however, that there were considerable variations in the severity of the infection, in that there was a variable response to treatment with the same drug. The substances to be tested for their prophylactic or therapeutic effect were injected into the right thigh at the site of infection immediately after or at varying intervals after infection.

EXPERIMENTAL RESULTS

The results are presented in a series of tables in which the mortality for only 3 days is considered since mice surviving that time usually survive indefinitely. The average number of days survived, shown in each table, is obtained by dividing the total number of whole days survived in each group of mice by the number of mice in the group. The sum of a number of experiments with sulphanilamide, done during the same period, is included in table I for comparison.

TABLE I—EFFECT ON *Cl. welchii* INFECTION IN MICE OF SULPHANILAMIDE, ZINC PEROXIDE, PROFLAVINE, AND PENICILLIN, ADMINISTERED LOCALLY AT TIME OF INFECTION

Drug	No. of expts.	Mice	Mice dying on day			Survived 3 days and %	Av. no. of days survived
			1	2	3		
Sulphanilamide 40 mg.	7	60	11	13	5	31 (52)	1·9
Zinc peroxide 20 mg.	4	36	7	7	4	18 (50)	1·9
Proflavine 0·5 mg. ..	6	48	7	3	1	37 (77)	2·4
Penicillin 34 units ..	3	24	0	0	0	24 (100)	3·0

A control group of untreated mice in each experiment all died within 24 hours.

Zinc peroxide.—The preparation used in these experiments contains about 20% zinc peroxide. It will be seen from table I that 20 mg. of zinc peroxide is as effective as 40 mg. of sulphanilamide when administered locally at the time of infection. This result is confirmed by expt. 1, table II, where the two drugs are compared directly. In expts. 2 and 3, table II, the prophylactic action of zinc peroxide is compared with 'Hyperol' (Richter), a solid preparation of hydrogen peroxide and urea yielding 35% hydrogen peroxide by weight, and with zinc oxide. These experiments show that 10 mg. of zinc peroxide is of more value than 100 mg. of hyperol and that zinc oxide is as effective as zinc peroxide. It seems therefore that, although the oxygenating chemicals may be of some value in preventing the development of *Cl. welchii* infection, the zinc ion probably plays a large part in the bacteriostatic action of zinc peroxide. Tests for the effect of delay on the local application of zinc peroxide and hyperol show that an hour's delay in administration totally annuls their preventive effect, as is shown for zinc peroxide in expt. 3, table III. It can be concluded that although zinc peroxide has a powerful bacteriostatic action on *Cl. welchii* it is unable to exert this action once the organisms have invaded the tissues.

Proflavine.—The usual dose of proflavine used was 0·1 c.cm. of a 0·5% solution in distilled water, equivalent to 0·5 mg. of the drug. This dose is ½ of the LD 50 dose as determined by Rubbo, Albert and Maxwell (1942) and is probably less than half the maximum tolerated dose. It will be seen from table I, which summarises a number of experiments, that 0·5 mg. of proflavine is of greater value than 40 mg. of sulphanilamide in preventing the development of *Cl. welchii* infection when it is applied locally at the time of infection. The superiority of proflavine to sulphanilamide in this respect is borne out by expt. 4 in table II, where their prophylactic action is compared directly. A further test is required to determine whether proflavine, like the sulphonamides, can exert its bacteriostatic action on *Cl. welchii* which have invaded the tissues. Such a test is shown in expt. 1, table III; when the local administration of proflavine is delayed for an hour its preventive value is only slightly diminished, but after 3 or more hours, when the organisms have invaded the blood-stream, treatment with proflavine is apparently of little or no value. These results are similar to those previously obtained with sulphanilamide (McIntosh and Selbie 1941), except that in delayed treatment the preventive action of proflavine is greater than that of sulphanilamide. When the effect of 0·5 mg. of proflavine

is compared directly with that of 40 mg. of sulphanilamide applied locally an hour after infection, as in expt. 3, table III, it will be seen that proflavine is much more active than sulphanilamide in preventing the development of *Cl. welchii* infection. Expt. 4, table III, compares the action of proflavine and sulphathiazole at 1½ hours after infection and again shows the superiority of proflavine. In the latter experiment combined treatment with full doses of proflavine and sulphathiazole appears to be of less value than treatment with either drug alone.

Penicillin.—A sample of penicillin was kindly supplied by Dr. C. G. Pope of the Wellcome Physiological Research Laboratories. This preparation, PN183, consists of a solution of the barium salt and contains 170 Oxford units per c.cm. The dose employed in mice was 0·2 c.cm., equivalent to 34 Oxford units. This dose was sufficient to save all the mice in three experiments (table I). Expt. 2, table III, shows that penicillin is also of great value in preventing death from *Cl. welchii* when it is administered after a delay of an hour, and is also of some value in delaying death when it is administered 3 and 6 hours after infection. The superiority of penicillin to proflavine in local treatment is shown in expt. 5, table III, where the effect of immediate and delayed administration of the two drugs is directly compared. From these results it appears that penicillin is of greater value than proflavine or the sulphonamides in preventing the development of *Cl. welchii* infection.

Gramicidin.—A sample of tyrothricin, the preparation used in these experiments, was supplied to us by the Medical Research Council through the courtesy of Sir Henry Dale. It is a water insoluble, alcohol soluble, fraction of the bactericidal substance originally prepared by Dubos (1939) from a soil bacterium. It contains both gramicidin, active against gram-positive bacteria, and tyrocidine, which is also active against gram-negative organisms (Hotchkiss and Dubos 1940). In our hands this preparation inhibits the growth cultures of *Cl. welchii*, *Cl. septique* and *Cl. œdematiens* in a concentration of 1·0 μg. per c.cm. and has occasionally prevented the growth of *Cl. welchii* in a concentration of 0·1 μg. per c.cm.

The action of tyrothricin on the development of *Cl. welchii* in mice was tested by injecting a suspension in saline, immediately after infection. The results were discouraging in that most of the treated mice died within 24 hours and none survived to the third day even with doses of 2 μg. It appears therefore that although tyrothricin has a powerful bacteriostatic action on *Cl. welchii* in vitro it is not likely to give commensurate results clinically in its present form.

TABLE II—COMPARATIVE EFFECTS ON *Cl. welchii* INFECTION IN MICE OF ZINC PEROXIDE AND SULPHANILAMIDE, HYPEROL AND ZINC OXIDE, AND OF PROFLAVINE AND SULPHANILAMIDE, ADMINISTERED LOCALLY AT THE TIME OF INFECTION

Expt.	Drug	Mice	Mice dying on day			Survived 3 days	Av. no. of days survived
			1	2	3		
1	Zinc peroxide 20 mg.	12	1	3	0	8	2·3
	Sulphanilamide 40 mg.	12	0	2	2	8	2·5
2	Zinc peroxide 10 mg.	12	2	2	0	8	2·2
	Hyperol 100 mg. ..	12	6	1	0	5	1·3
3	Zinc peroxide 20 mg.	6	3	3	..	0	0·5
	Zinc oxide 20 mg. ..	6	3	3	..	0	0·5
4	Proflavine 0·5 mg. ..	12	0	1	0	11	2·8
	Sulphanilamide 40 mg.	12	3	0	1	8	2·2

In each experiment a control group of untreated mice, equal in number to the treated groups, all died within 24 hours.

DISCUSSION

In trying to assess the true preventive and therapeutic values of the remedies reported on here an endeavour has been made to produce an experimental infection comparable to the natural infection. Human gas gangrene develops when limb muscles have been severely lacerated and simultaneously contaminated with soil bacteria. In the natural disease the clostridia are in the resting (sporing) stage and thus when the wound is infected there can be none of their own bacterial aggressin (toxin) present. The inciting agent was shown by Bullock (Gye) and Cramer (1919) in the last war to be in all probability the calcium ion. They showed that pathogenic clostridia washed free of all toxin were no longer capable of inciting an infection but could do so if a small amount of calcium chloride was injected along with them.

TABLE III—EFFECT ON *Cl. welchii* INFECTION IN MICE OF DELAYED LOCAL ADMINISTRATION OF PROFLAVINE AND PENICILLIN AND COMPARATIVE EFFECTS OF DELAY ON PREVENTIVE ACTION OF PROFLAVINE, SULPHANILAMIDE, SULPHATHIAZOLE AND ZINC PEROXIDE, AND OF PROFLAVINE AND PENICILLIN

Expt.	Drug	Treatment given after hours	Mice	Mice dying on day			Survived 3 days	Av. no. of days survived
				1	2	3		
1	Proflavine, 1·0 mg.	0	6	2	0	0	4	2·0
		1	6	2	0	1	3	1·8
		3	6	4	2	..	0	0·3
		6	6	6	..	..	0	0
2	Penicillin, 34 units	0	6	0	0	0	6	3·0
		1	6	1	0	0	5	2·5
		3	6	2	2	2	0	1·0
		6	6	3	3	..	0	0·5
3	Proflavine, 0·5 mg.	1	12	6	0	0	6	1·5
	Sulphanilamide 40 mg.	1	12	8	1	0	3	0·8
	Zinc peroxide 20 mg.	1	12	12	..	..	0	0
4	Proflavine 0·5 mg. ..	1½	6	3	1	0	2	1·2
	Sulphathiazole 40 mg.	1½	6	3	2	0	1	0·8
	Proflavine 0·5 mg. and sulphathiazole 40 mg.	1½	6	3	3	..	0	0·5
5	Proflavine 0·5 mg.	0	12	3	0	0	9	2·3
		2	12	6	3	0	3	1·0
	Penicillin 34 units	0	12	0	0	0	12	3·0
		2	12	1	0	0	11	2·8

In each experiment a control group of untreated mice, equal in number to the treated groups, all died within 24 hours.

We have therefore induced our experimental infection in mice with toxin-free clostridia, using calcium chloride as the aggressin, the infective dose being so standardised that about 100 lethal (infecting) doses were used as the test inoculum. This dose produces at first a purely local infection which in the course of 3 or 4 hours becomes generalised as shown by the presence of clostridia in the blood. Thus we have a local and general infection on which the remedies can be tested, and these present different problems.

Experimental work on the action of zinc peroxide on *Cl. welchii* infection has given somewhat conflicting results. Reed and Orr (1942) found that in *Cl. welchii* infection in guineapigs the local application of zinc peroxide was a powerful prophylactic and that it was only slightly less effective than sulphathiazole in an established infection. On the other hand, Bliss, Long and Smith (1941) found that zinc peroxide administered locally had no effect on *Cl. welchii* infection in mice but was effective against infections with *Cl. septique*, *Cl. œdematiens* and *Cl. tetani*. Our results show that zinc peroxide is an effective prophylactic against *Cl. welchii* infection, but is without action once the organisms get into the tissues. This result would be expected if zinc peroxide acted through its oxygenating action, which can have a considerable effect as has been shown in our experiments with hyperol, because this would be more effective on unprotected bacteria than on bacteria protected from oxidative changes by the tissue fluids. The tissues may also act as a deterrent if, as Garrod (1940) has suggested and we have shown here, the zinc ion plays a large part in its antibacterial action.

Hawking (1941) has shown that proflavine will prevent infection of wounds in guineapigs by anaerobes subsequently inserted. On reopening such wounds on the third day he found fairly healthy tissues and only small numbers of bacilli. He however decided that the usefulness of proflavine was limited in view of the mediocre results obtained with acridine compounds in

the last war, presumably through their inability to reach bacteria situated inside the tissues. But we have shown that proflavine is not only more active than sulphanilamide in preventing the development of *Cl. welchii* infection in mice but that it is at least as active as sulphanilamide and sulphathiazole in an infection that has already developed. Proflavine has also the advantages of being bacteriostatic to a wide range of organisms and of having a low toxicity to tissue, as Garrod (1940) has emphasised. Although Jacoby, Medawar and Willmer (1941) found that proflavine is toxic to fibroblasts in tissue culture, Russell and Falconer (1941) and Manifold (1941) have shown that neutral solutions of proflavine are less toxic than sulphonamides to brain tissue. The recent experience of Mitchell and Buttle (1942) has also shown that large quantities of proflavine can be inserted in wounds with good results. In the doses we have used we have seen no injurious effects in mice. In clinical practice, however, large doses of proflavine should be neutralised immediately before application because much of the irritant effects of this drug are due to its high acidity. Much of the criticism that has been directed against the use of the acridine drugs in wound infections has been based on previous experience with acriflavine which is much more toxic than proflavine and should not therefore discourage further trials of proflavine in wound therapy. As Garrod (1940) has pointed out, proflavine is also much more easily prepared and of more regular composition than acriflavine, which is a mixture of compounds, so that proflavine is the drug of choice at the moment. We have experiments in hand on the effects of the new acridines described by Albert and others (1938) and Rubbo, Albert and Maxwell (1942) in clostridial infections.

The therapeutic action of penicillin on *Cl. septique* infection in mice was investigated by Chain and others (1940). In an infection which killed all untreated mice within 24 hours they were able to save all mice receiving repeated injections of penicillin. In our experiments the injection in the infected site of a single dose within 2 hours of infection was sufficient to save a high proportion of mice subjected to a severe infection. Compared with proflavine and the sulphonamides it appears to be the most powerful of the therapeutic substances that we have yet tested experimentally against this type of infection. It is also noteworthy that, judging by the statement of Florey and Jennings (1942) that 20 mg. of therapeutic penicillin containing 40–50 units per mg. caused serious embarrassment but not death in a mouse, the effective dose in our experiments is only about a 20th to a 30th of the toxic dose. The great therapeutic power and the low toxicity of penicillin seem to warrant extensive clinical trial when enough of this substance becomes available.

Gramicidin, another naturally occurring antibacterial substance, provides a striking contrast to penicillin. In spite of its great activity in vitro against *Cl. welchii* it has proved in our hands to be of little value against *Cl. welchii* infection in mice. It has also the great disadvantage of being highly toxic.

The various substances that we have tested fall into two distinct groups. In the first are the oxidising chemicals, zinc peroxide and hyperol, which appear to possess only an antiseptic action, because when their application to the infected site is delayed they fail to exercise preventive action. In the second group are the sulphonamides, proflavine and penicillin, which can be given after an hour's delay and still prevent infection to a large extent. The latter may be said to have selective chemotherapeutic action in that they can reach and exert their bacteriostatic effects on organisms that have invaded the tissues. When the infection becomes generalised the curative action of the local application of these substances is much reduced and with the exception of proflavine and penicillin is ineffective.

SUMMARY

The local application of zinc peroxide is apparently of no value in preventing the development of *Cl. welchii* infection in mice when the organisms have invaded the tissues.

Proflavine is of greater value than sulphanilamide and is at least as good as sulphathiazole in the local prophylaxis and treatment of *Cl. welchii* infection in mice and its use therefore as a wound dressing should be further explored.

Penicillin, injected at the site of infection within 3 hours of infection, is a powerful prophylactic against *Cl. welchii* infection in mice and is superior to proflavine and the sulphonamides in this respect.

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CONTROL OF PULMONARY TUBERCULOSIS IN MENTAL HOSPITALS

W. P. BERRINGTON
M D BELF, D P M
FIRST ASSISTANT MO

C. E. GREENWOOD
B M OXFD, D P M
SECOND ASSISTANT MO

WEST PARK HOSPITAL, EPSOM

THE report of the Medical Research Council's committee on tuberculosis in war-time [1] and Trail's comprehensive study [2] have dealt adequately with tuberculosis in the general population. The committee have also investigated the present situation in mental hospitals, but as far as we are aware no figures based on research in these hospitals exist. We present here the results of such research on a small community of male psychotics, and suggest a method for the control of tuberculosis in this type of community—a method owing its inception entirely to the economic exigencies of the moment.

In May, 1941, it became obvious that the mortality-rate from pulmonary tubercle, particularly in the male population of this hospital, was rapidly increasing. Looking up our records, we find that deaths from this disease from 1932 to 1941 were as follows:

1932	*1933*	*1934*	*1935*	*1936*	*1937*	*1938*	*1939*	*1940*	*1941*
7	7	9	5	6	8	10	11	15	27

During these years the male population of the hospital remained stationary at about 1100.

In the MRC report we find that mental hospitals have had, at least since 1910, the reputation of eclipsing the mortality-rate in the general population. Thus in peace-time the rate was 9 or 10 times that of the general population and rose to more than twice its peace-time rate in 1918. Now, the rate has again risen steeply, to a greater extent in the males than in females. Measures advocated for early diagnosis—chiefly mass miniature radiography—are now well known and have already, to some extent, been put into practice among the general public. This method, to some extent and in due course, will doubtless be put into operation in mental hospitals. The questions we must ask are to what extent, and in what period of time?

It now seems certain that X-ray facilities will be made available to all mental hospitals, but not apparently in the form of mass miniature radiography. To quote from the report—"the Committee therefore recommends that . . . efforts should be made, so far as possible, to take periodical chest radiographs of all residents, whether they have symptoms or not, in order to discover and treat early cases. Many hospitals already have X-ray apparatus suitable to this purpose." In other words some hospitals will still be committed to taking full sized X-ray photographs. In our own case we viewed the expense of this programme in 1100 patients (or, including females, over 2000) with dismay, and we think that this

1. *Spec. Rep. Ser. med. Res. Coun., Lond.* No. 246, 1942.
2. Trail, R. R. *Lancet*, 1942, ii, 413.

will also be an economic problem for other hospitals. And it seems likely that, at a moderate estimate, several months must elapse before the psychotic population can be catered for.

The following scheme was carried out on the male population—about 1100 patients—in this hospital. From May, 1941, onwards the erythrocyte sedimentation-rate of every patient in the hospital and of every new admission was measured, excluding those already ill with a known active organic disease. Those with sedimentation-rates of over 14 mm. per hour were radiographed unless other active organic disease was found to account for the increased rate. Those with sedimentation-rates between 7 and 14 mm. per hour were tested a few weeks later, and if the rate had risen to 14 mm. per hour, or over they were also radiographed. Altogether 384 X-ray photographs were taken, but in this number were included some examined a second time for follow-up purposes.

It has long been recognised that the sedimentation-rate is not per se a diagnostic method—that in fact it is merely an index of active organic disease. More important still, active tuberculosis has been known to exist in the presence of a normal sedimentation-rate, as Trail mentions.[3] The real question is, how often this anomaly is found. We suggest that it is rare. In 16 months experience of this method, in the course of which many thousands of sedimentation-rates have been performed, we have not yet found a case of active pulmonary tuberculosis having a sedimentation-rate within normal limits.

Of those radiographed 90 showed appearances of active disease, and 26 were considered to be suspicious—a total of 116 cases. These cases have been observed over a year. The average loss of weight per person from June, 1938, to June, 1941 (when the disease was diagnosed), for the 116 cases was 14¼ lb., to the nearest ¼ lb. This may be compared with an average loss of weight in 782 ambulant non-tuberculosis patients of 8¼ lb. over the same period. During the investigation 54 of the 116 patients had pyrexia of varying degree, and in 17 tubercle bacilli were found in the sputum, fæces, or pleural fluid. The fact that the bacillus was found in such a small number of cases was partly due to the early stage or low activity of the disease in many cases, but also to lack of coöperation from patients in providing sputum. The deteriorated type of schizophrenic who seemed most prone to this disease, coughs but little and swallows his sputum. Bacteriological investigations must therefore be made on the fæces, by culture on Lowenstein-Jensen medium.

With a few exceptions our patients were treated in bed for a time, the aim being to bring the sedimentation-rate back to normal limits. On the whole this method was fairly successful (see table).

SEDIMENTATION-RATES BEFORE AND AFTER TREATMENT

Sedimentation-rates mm. p.h.	Number of cases		Sedimentation-rates mm. p.h.	Number of cases	
	At times of diagnosis	At end of review		At times of diagnosis	At end of review
100+	1	0	40–	10	6
90–	0	0	30–	21	6
80–	2	1	20–	31	22
70–	5	3	14–	30	17
60–	6	1	5–	3	46
50–	6	2	1–	0	11

Of the 116 cases, 40 still remain in bed, 70 are ambulant and 6 have died of pulmonary tuberculosis. The average gain in weight during treatment has been 6¼ lb. The results of examination of sedimentation-rates for 1942 (excluding the 7–13 mm. p.h. reports which are not yet complete) have exceeded expectation. The total number of high sedimentation-rates has been lower, and after excluding other causes only 52 patients were found to require radiological examination. Of these 14 were considered by the radiologists to show signs of active disease, and 9 to be suspicious, a total of 23—almost half those radiographed.

The method entails much less labour than might be thought, blood being taken and sedimentation tubes filled in the ward. All patients in bed are weighed weekly, and sedimentation-rates of all cases are estimated monthly. In this way activity in an ambulant case is readily detected—a point of great importance we think, since many of these cases are stuporous and inaccessible. The sedimentation-rate of all patients is again being investigated at the beginning of the second year.

Technique.—A 2 c.cm. Record syringe with a small-bore needle is filled to the min. 8 mark with 3·8% sodium citrate, and blood is drawn up to the min. 40 mark. The contents are mixed in the syringe, ejected into a centrifuge tube, drawn up 6 times in a Westergren 200 mm. tube and placed in the rack. Readings (taken at bottom of clear fluid level) are taken at the end of the first and second hours, and the SR calculated according to the formula:

$$\frac{A+\frac{B}{2}}{2}$$ where A = first hour reading and B = second hour reading.

The sodium citrate when issued in bulk was prone to develop moulds, and we are indebted to Mr. R. H. Henriksen,[3] then pharmacist at this hospital, who found, after a number of experiments, that phenylmercuric nitrate did not affect the sedimentation-rate. It preserves the citrate solution when added in 0·002% dilution.

As the MRC report clearly shows this is not essentially a war-time problem of the mental hospitals; adverse conditions must already have been present during peace. A disproportionate number of our patients were found in the "wet and dirty" ward of the hospital. Here we find the deteriorated psychotic, doubly incontinent, mute and inaccessible patients, uncoöperative in the extreme. We suggest that it is this type of ward which is the nidus of tuberculosis (and dysentery) in mental hospitals, and that unless objective examinations are often carried out on these patients, they will disseminate their disease before they are discovered.

In peace-time we may find our method not ideal, but at present we suggest it as an efficient stop-gap.

We wish to thank Dr. W. Allen Daley, medical officer of health to the LCC, and Dr. W. A. Caldwell, medical superintendent of this hospital, for permission to publish these results, and the LCC Central Pathological Laboratory, and the radiological staff of an EMS hospital for their help.

SLIT-LAMP MICROSCOPE IN NUTRITION SURVEYS

OBSERVATIONS IN SCHOOL-CHILDREN

J. H. KODICEK
M D PRAGUE
ASSISTANT PHYSICIAN TO THE EYE DEPARTMENT, ADDENBROOKE'S HOSPITAL, CAMBRIDGE

JOHN YUDKIN *
M A, M B, PH D CAMB, F I C
DUNN NUTRITIONAL LABORATORY, UNIVERSITY OF CAMBRIDGE AND MEDICAL RESEARCH COUNCIL

SEVERE deficiency of vitamin A has long been known to result, in animals and man, in keratinisation of the conjunctiva and sometimes also of the cornea. Severe deficiency of riboflavin in rats was shown by Bessey and Wolbach (1939) to lead to corneal vascularisation. American workers have recently suggested that mild deficiency of either of these dietary factors results in slight conjunctival or corneal changes which can be detected by examination with the slit-lamp. Kruse (1941) describes a continuous series of abnormalities of the conjunctiva which he believes express stages of severity of deficiency of vitamin A. Beginning with the normal eye, in which both the superficial and the deep layers of the conjunctiva are smooth and transparent, he describes a gradual diminution in light transmission; the conjunctiva becomes wrinkled, the deep and then the superficial layer becomes translucent and later opaque, and eventually discrete raised keratinised patches—Bitot spots—are seen; mild lacrimation and photophobia are observed during the examination.

With regard to deficiency of riboflavin, Sydenstricker and his co-workers find an increased limbal vascularisation (Sydenstricker et al. 1940, Kruse et al. 1940). According to their description, in the earliest stages there is an engorgement of the limbic plexus and an increase in the number of capillary loops, which extend to the corneoscleral junction. Later, the cornea itself is invaded by capillary "streamers" running centripetally; in the

3. *Pharmaceut. J.* 1942, **94**, 14.

* Sir Halley Stewart Research Fellow.

more advanced stages these may anastomose and form arcades from which further streamers arise. Symptoms of lacrimation and photophobia are more noticeable than with the keratinisation; other changes due to ariboflavinosis, such as cheilosis and glossitis, are frequently present.

The only survey so far reported in which these slit-lamp examinations have been made is one by Wiehl and Kruse (1941) in New York. They examined some 500 high-school pupils of a low income level, 300 high-school pupils of a high income level and 140 adults employed by the WPA. The students were between 12 and 20 years of age, the adults between 17 and 65. Conjunctival changes (referred to by them as "avitaminosis A") was found in nearly 90% of the poorer children and nearly 100% of the workers (the conjunctivæ of the better class children were not examined). Corneal vascularisation was found in 2% of the wealthier children, 75% of the poorer children and about 40% of the workers.

During a nutritional survey of 1100 Cambridge school-children carried out in January and February, 1942, 496 of the older children were examined by slit-lamp microscopy. We record our results at the present early stage not because we have discovered the cause of the findings we describe, nor even because we are able to define what is normal and what abnormal, but because the use of the slit-lamp for nutritional surveys is very recent and a description of the common types of findings may help in the adoption of a uniform classification and nomenclature.

The children examined were from three elementary schools—two junior and one senior school. Junior school A was in a poor district of the town; junior school B and the senior school were situated close together in a fairly well-to-do part of the town. The children examined at the junior schools were between 8 and 10 years of age; those in the senior school were all 11 years old. About equal numbers of boys and girls were examined.

RESULTS

Corneal vascularity.—Our observations in regard to the increased vascularity at the limbus, ascribed to early ariboflavinosis, resembled the changes described by the American workers. We have, however, classed as positive findings only those degrees of vascularity in which there is actual invasion of the clear cornea. In children showing these changes the limbic plexus showed congestion and proliferation, and capillary streamers arising from it extended centripetally beyond the corneoscleral junction. This invasion when present was always seen round the entire margin of the corneoscleral junction and there was never any appreciable difference in degree of vascularity between the right and the left eye. By taking as abnormal only those eyes in which blood-vessels invade the clear cornea we have adopted a somewhat severer criterion of abnormality than Sydenstricker and his co-workers. These observers class, as an earlier stage of abnormality, a proliferation and engorgement of the limbic plexus; invasion of the cornea, in their view, is a later stage of the same pathological process. Thus, by our taking as abnormal only the latter findings, it is likely that we have included only cases of true ariboflavinosis. This is supported by the observation (J. H. K.) that changes similar in type and extent may be seen in adults, and riboflavin in these cases induces obliteration of the capillaries, while there was no sign of any other possible cause for vascularisation. Altogether, 19 children were found with corneal vascularity (see table). The proportion was significantly higher in the older children—1·5% of the children at the junior schools compared with 8% of those at the senior school. The difference in incidence between boys and girls was not significant.[1]

Conjunctival epithelium.—Kruse's description of the changes in the superficial and the deep layers of the conjunctiva refers to adults and adolescents and we have seen in adults also conditions closely resembling those Kruse described. In the children, on the other hand, the conjunctiva was altogether more transparent and it was impossible to follow the classification adopted by Kruse (see discussion). Moreover, we felt it of greater importance to concentrate on the epithelial changes rather than those of the subconjunctival tissue, since it is in the epithelium that vitamin-A deficiency is known to show itself. For these reasons, we have adopted a different classification for our findings. Five groups have been differentiated, as follows.

Group 1.—Smooth, transparent conjunctival epithelium.

Group 2.—Transparent epithelium with superficial wrinkling, usually located midway between the limbus and the caruncle or external canthus, or nearer to the limbus. The wrinkles form networks of various shapes, but those nearer the limbus are often arranged concentrically to it. There are no opacities or thickening of the subconjunctival tissues.

Group 3.—The wrinkling is more pronounced. Here and there, mostly on the top of the wrinkles, are seen fine points reflecting the light, which do not disappear when viewed from different angles. No opacities in the conjunctiva are visible.

Group 4.—The points of reflection seen in grade 3 appear to have aggregated, forming small islands with a definite fine opacity. At the edges of these opaque islands are seen points of reflected light resembling those in group 3. The opacities are of various shapes, most often round or oval. They are of a dead-white or milky colour and are not raised above the surrounding tissue.

Group 5.—The opaque areas are larger than in group 4 and without points of reflection at their edges.

Let us say at once that the differences between the groups are very slight and it may be thought that we are making an unnecessarily fine division. Yet we experienced no difficulty in distinguishing the groups in most of the children, and at this early stage of knowledge concerning these changes we think it better to err on the side of over-differentiation rather than class together slightly different findings which may eventually be shown to be due to quite different causes.

We have intentionally referred in our classification to groups rather than grades since we do not at present stress the claim that they represent a continuous series of increasing amount of change. It is however likely that in fact they represent such a series. First, although it is usually not difficult to determine into which group a child should be placed, it is possible to range the children, beginning with some in group 1 and ending with some in group 5, in such a say that the differences between successive children are very slight indeed. Secondly, the distribution of the children among the five groups suggests that the groups represent grades of change in a continuous series. Thirdly, in all but 30 of the 496 children examined, the two eyes showed findings characteristic of the same group. Of the 30 in which this did not obtain, the difference in 22 was only of one group and in the remaining 8 of two troups.

Our findings are summarised in the table. After statistical analysis[1] the facts which emerge are these. Considering the boys and girls together, there is no difference between the two junior schools, but children from each of the junior schools show fewer positive findings (i.e., groups 2–5) than those in the senior school. Boys show fewest positive findings in junior school B, more in junior school A, and most in the senior school; among the girls there is no such difference between the schools. In junior school A and in the senior school, a smaller proportion of the boys than of the girls are in group 1, but this sex difference does not show itself in junior school B.

We do not know the ultimate cause of the conditions we have described and it is possible that many factors are involved, but our results suggest that three of the factors which play a part in producing these conditions are age, sex and economic status. Between the ages of 8 and 11 years, it seems, age and economic status affect the conjunctivæ of boys but not of girls. By the age of 11, the conjunctival changes in children of a good economic status are seen more frequently in boys than in girls, although at the age of 8 this difference does not exist. In children of a lower economic status the difference between boys and girls shows itself at age 8.

1. The comparison between two sets of children—i.e., boys with girls, or one school with another—has been made by comparing the proportions with positive findings in the two cases. A difference between two sets of children is taken as significant if the difference in these proportions is greater than twice its standard error—i.e., the difference would arise by chance once in twenty times or less often. For example, to test the significance of the difference in conjunctival findings in junior school A with those in the senior school we have compared the proportions 74/149 and 116/191. Analysis shows that the difference in these proportions is 2·1 its standard error and hence is significant.

SUMMARY OF FINDINGS

—	Junior school A						Junior school B						Senior school					
	Number			Per cent.			Number			Per cent.			Number			Per cent.		
	Total	B	G	Total	B	G	Total	B	G	Total	B	G	Total	B	G	Total	B	G
No. examined ..	149	78	71	100	100	100	156	75	81	100	100	100	191	92	99	100	100	100
Conjunctival findings—																		
Group 1	75	27	48	50	35	68	89	44	45	57	59	56	75	19	56	39	21	57
Group 2	27	22	5	18	28	7	25	10	15	16	13	19	52	38	14	27	41	14
Group 3	25	17	8	17	22	11	27	10	17	17	13	21	39	24	15	20	26	15
Group 4	13	8	5	9	10	7	14	10	4	9	13	5	15	5	10	8	5	10
Group 5	9	4	5	6	5	7	1	1	0	1	1	0	10	6	4	5	7	4
Corneal vascularity	2	2	0	1·5	3	0	2	1	1	1·5	1	1	15	5	10	8	5	10

B and G = Boys and girls

In addition to these changes in the epithelium, we have noted 17 children in whom a thickening or cystic change is present in the deeper layers of the conjunctiva. This was usually observed near the plica semilunaris and it was apparently not associated with either sex or age.

SLIT-LAMP MICROSCOPY AS A MEANS OF DETECTING DIETARY DEFICIENCY

Corneal vascularity.—By taking, as we have done, actual invasion of the cornea as the criterion of abnormality, we may have failed to include some cases of mild ariboflavinosis. Some of the children with a high degree of vascularity confined to the limbus were probably instances of this sort. But only a therapeutic test would prove this and this we have not done. Invasion of the cornea itself by capillaries from the limbus is more likely to be of definite dietary origin, and by considering only children showing this we think we are dealing with cases of real deficiency.

Conjunctival findings.—The rôle of vitamin A in the production of the conjunctival changes is obscure. It is agreed that severe deficiency of vitamin A leads to keratinisation of the conjunctival epithelium, a condition variously referred to as xerophthalmia, keratinisation or xerosis conjunctivæ. There is usually generalised or localised opacity of the conjunctiva due to metaplasia of the epithelium. The localised lesions, when severe, consist of dry raised chalky-white "foam-like" plaques; these constitute the "Bitot spots." The epithelial changes may extend to the cornea, and if severe enough may lead to the dryness and ulceration referred to as keratomalacia.

Kruse maintains that, in examining a number of individuals with the slit-lamp, he can grade them in a continuous series ranging from those with perfectly normal, transparent conjunctivæ to those having characteristic Bitot spots. As intermediate grades, he recognises first a translucency then an opacity in one or more zones, and he claims that the changes represent various stages in the development of xerophthalmia due to deficiency of vitamin A. In other words, according to Kruse, examination of the eye by the slit-lamp may be used for the detection of early signs of deficiency of this vitamin. In fact, Wiehl and Kruse (1941) in the survey already mentioned definitely class subjects with these conjunctival findings as showing avitaminosis A. Several considerations however indicate that the relationship between these lesions and vitamin A is by no means so definite. We have already pointed out that changes induced in deficiency of vitamin A are known to affect the conjunctival epithelium, but the changes reported by Kruse, unlike those we describe, are in the subepithelial layers of the conjunctiva. While the present report was being prepared, a paper has appeared by Berliner (1942) which strongly criticises the conclusions of Kruse for this and other reasons. Berliner's chief arguments are as follows.

1. The majority of the "spots" described by Kruse are almost certainly pingueculæ, in which the changes in the conjunctiva are not in the epithelium, where deficiency of vitamin A shows itself, but in the subepithelial layer.

2. Most of the subjects with positive slit-lamp findings have normal levels of vitamin A in the blood.

3. The changes are more common in the higher age-groups.

Berliner considers that most of the changes are normal presenile or senile alterations and are not prexerosis, xerosis or Bitot spots due to deficiency of vitamin A. None of our children had conjunctival opacities as described by Kruse but we have seen just such opacities in adults; our experience leads us to conclusions similar to those of Berliner. On the other hand, certain of Berliner's arguments are not so devastating as at first appears. The level of vitamin A in the blood, at least in adults, is not a sufficient criterion of vitamin-A nutrition; poor dark-adaptation which can be cured by the vitamin often coexists with quite high levels of vitamin A in the blood (S. Yudkin 1941). Moreover, the fact that the conjunctival findings are more frequent in older subjects does not necessarily mean that they are normal findings due solely to age; it is possible that they are due to prolonged mild deficiency of the vitamin, so that they would naturally be more often seen in the higher age-groups. It is clear that the question of the relationship between the conjunctival changes of Kruse and vitamin-A deficiency must still be regarded as open.

Probably the most serious objection to Kruse's view is the fact that the changes he describes are in the subepithelial layers of the conjunctiva. For this reason we feel that any early signs of vitamin-A deficiency will more likely be shown in studies such as ours which are concerned with epithelial findings, although at this stage we certainly do not claim that any one of the findings we describe is in fact an index of deficiency of vitamin A. Further work is clearly necessary. We are now examining the effect of prolonged vitamin therapy on these children and this may help to demonstrate whether vitamin A plays a part in the production of the epithelial changes.

The opacities in the subepithelial layers of the conjunctiva which the American workers have described were not seen by us in children, but the epithelial findings in children which are reported here can also be distinguished in adults. Moreover the epithelial findings in adults are in no way correlated with the presence or absence of opacity in the deeper layers. We therefore suggest that, if other workers would also record their observations in the epithelium as well as in the deeper layers of the conjunctiva, it would probably help to hasten the elucidation of the cause of these changes.

DISTRIBUTION OF FINDINGS IN DIFFERENT SCHOOLS

Corneal vascularisation.—As we have said, the degree of vascularity which we have taken as abnormal is almost certainly due to riboflavin deficiency. There are two possible reasons why more of the older children show this deficiency. The first is that all the children have been subjected to a similar mild deficiency and the older children have consequently had a longer time in which to develop the signs. Alternatively, it may be that the distribution of milk in schools, which has increased greatly in recent years, has meant that the younger children have had a more liberal supply of milk and hence of riboflavin than the older ones.

Conjunctival epithelium.—The interpretation of the differences between the schools in respect to the number of children showing positive epithelial findings is less

easy, since, unlike the corneal vascularity, we have not been able to decide on their cause, nor even to define limits of normality. All we can say is that, if in two schools there is a significantly different distribution of the children among the five groups of epithelial findings, the factors concerned in their production must be present to a different extent in these schools. We can then state definitely that, whatever the causes of the positive findings in the epithelium which we here describe, they exist to a greater extent in the poor class junior school than in the better class junior school. Our results indicate that the epithelial findings are associated with age, economic status and sex, being commoner in the poorer class school compared with the better class school, in boys rather than girls, and in older rather than younger children. But until further data are available it would be speculative to do more than record these differences.

CORRELATION OF SLIT-LAMP FINDINGS WITH OTHER FACTORS

The examination of the eyes of these children by slit-lamp was part of a more exhaustive survey. Among other tests carried out were: clinical examination, especially for signs of dietary deficiency; examination of the fundus oculi and measurement of visual acuity; examination of the teeth; measurements of height and weight; estimation of hæmoglobin; estimation of grip with a hand dynamometer; measurement of intelligence and of educational attainment. A record is also being kept by the teachers of general behaviour and performance in schools and of absences and illnesses. These results are now being analysed with a view to determining possible correlations between the various measurements. We can already say that the slit-lamp findings, both conjunctival and limbal, are not correlated with height and weight (or Tuxford's height-weight index), hæmoglobin, dark-adaptation, intelligence or educational attainment.

SUMMARY

An examination with the slit-lamp microscope has been made of the eyes of 496 elementary-school children in Cambridge, aged between 8 and 11 years.

Corneal vascularisation, taken as an actual invasion of the clear cornea with vessels from the limbus, and said to be indicative of deficiency of riboflavin, has been found in about 4% of the children. The proportion was significantly higher in older than in younger children.

The importance of examining the epithelial layer of the conjunctiva is stressed. Reasons are given for supposing that this is more likely to show changes due to dietary deficiency, especially deficiency of vitamin A, than examination of the subepithelial tissues according to the method of Kruse and his co-workers. Opacities in these subepithelial tissues have not been observed in the children examined by us.

Our observations have led us to classify the various findings in the epithelium into 5 groups. The first contains those children whose conjunctival epithelium is perfectly smooth and transparent, while the other groups contain those showing varying degrees of wrinkling and opacity. It is suggested tentatively that these represent 5 grades of increasing severity of change.

The factors which appear to affect the production of these epithelial changes are age, economic status and sex. Thus, children with smooth transparent conjunctival epithelium (group 1) are less common at the higher ages, in the poorer school, and amongst boys rather than girls. It must be emphasised however that we do not know the cause of these epithelial changes; in particular, we do not claim at this stage that they are due to deficiency of vitamin A.

We wish to record our gratitude to the teachers of the Cambridge schools, without whose coöperation this work would have been impossible.

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AN article in an annual review may range from a thinly disguised card-index to a mature and critical appreciation of new conceptions. The former is too technical for anyone but the expert, and of little interest to him because he knows all about it already; nevertheless, it is a useful record, and changing authorship makes such surveys stimulating. The present volume has used them to advantage, but also contains a high proportion of the more mature type of article. General physiology is as usual well represented (permeability, effects of neutron rays, genetics, development, growth) and distinguished workers have contributed to the six articles bearing on neurology, electrophysiology and physiological psychology. Subjects often neglected, such as water metabolism, the skin, applied physiology and drug addiction are clearly handled, and metabolism is well represented. Reproduction, the kidney, the digestive system and the blood each receive a section, and there are two chapters on the circulation. The wide perspective embraced by Peters and Shannon in their respective fields of water metabolism and the kidney, Ruch's tabloid explanatory method of dealing with the technical field of reflex action, and Long's careful arrangement of material on endocrines and metabolism are examples of skill in presentation especially worthy of note, though the same qualities appear in other articles. Inevitably the authorship becomes more North American, but it is hoped that after the war the editors will enhance the value of their series by periodically introducing foreign points of view.

Management of the Sick Infant and Child

(6th ed.) LANGLEY PORTER, MD; WILLIAM E. CARTER, MD. London: Henry Kimpton. Pp. 977. 57*s.* 6*d.*

SINCE it first appeared ten years ago "Porter and Carter" has won justifiable popularity among English-speaking pædiatricians. This extensively revised sixth edition comes four years after the last. In the preface many colleagues of the University of California Medical School and elsewhere are mentioned who have helped in the process of revision, especially the sections on allergy, blood and its disorders and in various parts of the book where the use of new sulphonamides is discussed. Nearly a third of the new volume deals with therapeutic and diagnostic procedures, dietetic details and drugs. This product of the California school is of a high standard.

Illustrations of Surgical Treatment

(2nd ed.) ERIC L. FARQUHARSON, MD Edin., FRCSE, major RAMC; formerly clinical tutor and temporary assistant surgeon, Edinburgh Royal Infirmary. Edinburgh: E. and S. Livingstone. Pp. 391. 25*s.*

Mr. Farquharson fills in some of the gaps left in most surgical textbooks, showing in detail how recommended procedures, apart from surgical operations, are most easily carried out. Minor surgery demands attention to detail, and these careful descriptions with photographs should enable even the novice to apply the methods correctly. The expert too will find much of value, for the book also contains many useful hints from a man who is obviously mechanically-minded. The first section deals with intravenous infusion therapy, describing the most recent methods and substances employed. The second gives useful tips on the application of mechanical and plaster-of-paris splints for various fractures and deformities, well illustrated by photographs. He shows the Thomas wrench being used by the handle; some prefer to see it used as Thomas himself taught, with the operator's hands protecting the part, and his body-weight used as the correcting force. The book ends with a series of plates showing surgical instruments; these have been well chosen and their uses are given in notes. This section will prove valuable to candidates for surgical examinations who nowadays have little time to hang about the instrument rooms.

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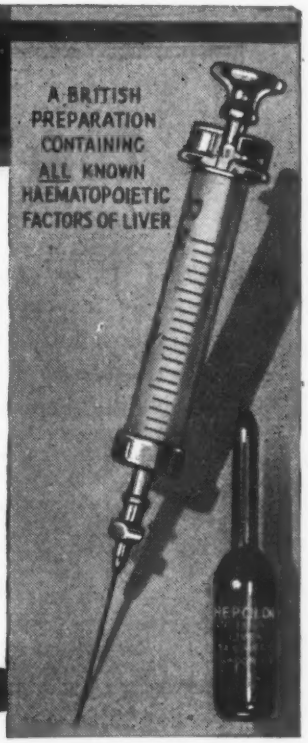

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THE LANCET

LONDON: SATURDAY, DECEMBER 26, 1942

TETANUS IN WAR-TIME

TETANUS, like gas gangrene, requires a particular set of circumstances for its occurrence. It needs, firstly, a manured soil; for the causal organism and its resistant spores live in and are shed from the intestine of many animals. Thus, *Clostridium tetani* was found in 27% of 193 samples of soil from the European battle-zones in the 1914–18 war[1]; it was present in 57 out of 79 samples from the cultivated fields of England, but not at all from the "wilds of Scotland"[2]; and now, in our opening pages, BOYD and MACLENNAN admit recovering it from only 8·8% of 91 samples collected between Daba and Benghazi during the present campaign in the Middle East. The second requirement is a wound which will encourage germination of the spore and toxin-production by the tetanus bacillus. Such are usually deep penetrating wounds with much necrosis of tissue or the presence of foreign bodies, and the rarity of tetanus after civilian accidents in peace-time is probably related more to the nature of the injury than to the absence of the infecting organism. Occasionally, however, tetanus develops after apparently trivial and surface wounds. Sepsis, and particularly the toxins of other anaerobes, also facilitates the onset of tetanus. The third requisite is the bringing together of the infective material (soil or soiled clothing or other foreign body) and the necrotic tissue plus a time-interval to allow germination and toxin-production. These three conditions are frequently fulfilled in war-wounds, whether suffered on the battlefield or in the bombed town, and prophylactic measures against tetanus therefore become of prime importance in war-time.

Tetanus has apparently been uncommon among air-raid casualties in this country. There are two possible explanations: (1) Most cases are quickly dealt with surgically, and surgical removal of necrotic tissue or foreign body still plays an essential part in the prophylaxis of tetanus as of gas gangrene; (2) tetanus antitoxin was given prophylactically to most of the air-raid casualties. Yet cases of tetanus have occurred in spite of a prophylactic dose of antitoxin, e.g., RADLEY SMITH[3] reported 7 cases of tetanus with 3 deaths among civilian casualties during a two-year period in one London sector: 6 of them had been given one prophylactic dose of tetanus antitoxin. During the same period, SMITH saw no case of tetanus among a much larger series of Service casualties, many of them evacuated from Dunkirk. Indeed, BENSTED[4] records only 8 cases of tetanus after the episode on the Western Front, all of them in soldiers not actively immunised. As large-scale active immunisation has not been practised among the civil population, and as one dose of prophylactic antitoxin may not protect against tetanus, the instructions regarding the use of tetanus antitoxin for air-raid casualties have been amended (E.M.S. Gen./33 and E.M.S.I. 351) so that every injured person, however trivial the wound, is to be given an initial dose of 3000 units of antitoxin when first seen at F.A.P. or hospital, with two further weekly injections if the individual has not been actively immunised. If the injury is severe, the doses should be increased two or threefold.

Active immunisation with tetanus toxoid is now a routine procedure in the Services, and, though a voluntary measure, the rarity of reactions means that some 95% of recruits accept it. Two doses of toxoid at an interval of 6 or more weeks produce an antitoxin response above the 0·01 unit per c.cm. which is regarded as the basal immunity level, but in a proportion of cases the titre falls below this level after some months.[5] A third dose of toxoid is therefore given 6–12 months after the primary inoculation, and this third dose "boosts" the antitoxin content to remarkably high levels (2–50 units per c.cm.) although the response may not occur until after 5 days.[6] Because of this lag-period and because a few individuals may fail to respond at all, it is a regulation in the British Forces that every man shall be given a prophylactic dose of tetanus antitoxin at the time of wounding. These precautions are not always carried out, and even when they are, tetanus may rarely supervene as BOYD and MACLENNAN have shown in their Middle East series of 18 cases, 5 of them among immunised troops, giving an incidence of 0·13 per 1000 wounded, and 13 among non-immunised men, giving an estimated incidence of 1·6 per 1000. That the risk of contracting tetanus was not inconsiderable is suggested by the finding of 18 toxigenic strains of *Cl. tetani* in 214 wounds of a severe type. Incidentally, it was perhaps more than a happy chance that a bacteriological expert on the plectridia (the terminal-sporing anaerobes) was available to differentiate the wheat from the chaff, for plectridia are commonly found in war-wounds, and their isolation and identification is no mean task.

Interest in this series of cases attaches principally to the occurrence of tetanus in men who had been actively immunised. In one patient, who recovered, there was only hearsay evidence about the infection. The other non-fatal case was a Maori who had been given two doses of toxoid a year previously and who developed a mild tetanus 13 days after a bullet-wound of the forearm. Of the three fatal cases, the first, an Indian, developed signs of tetanus 6 weeks after a cut in his hand, and he died 5 days later with a ruptured pulmonic cusp. The development of tetanus in this case can only be explained on the ground that the patient was non-immunisable. The other two cases fall into a different category. In both there was extensive necrosis of tissue without much frank sepsis, so that the tetanus bacillus was left undisturbed to manufacture its potent toxin. In the one, who had been immunised 20 months previously, symptoms developed in 5 days and the patient died 36 hours later. In the other, who had been given a boosting dose of toxoid three months earlier, the onset was delayed until the 9th day, but the large amount of toxin apparently swamped what should have been a more than adequate immunity. More radical surgery at the time of wounding would have probably saved both lives. In neither case was prophylactic antitoxin given, which raises the question "Would prophylactic antitoxin have prevented the onset of tetanus?" Opinion is still divided about the advisability of giving

1. Zeissler, J. and Rassfeld, L. *Veröff. Kriegs-u. KonstitPath.* 1928, **5**, 199.
2. Fildes, P. System of Bacteriology in Relation to Medicine, London, 1929, vol. iii, p. 321.
3. Smith, E. J. R. *Proc. Roy. Soc. Med.* 1941–42, **35**, 340.
4. Benstead, H. J. *Lancet*, 1940, ii, 788.
5. Marvell, D. M. and Parish, H. J. *Brit. med. J.* 1940, ii, 891.
6. Evans, D. G. *Lancet*, 1941, ii, 628.

antitoxin to an actively immunised and wounded soldier. The American and Canadian Forces follow RAMON and give an additional dose of toxoid at the time of wounding, and as all American troops are given a boosting dose before entering a theatre of war, the antibody content should ordinarily be sufficient to deal with a tetanus infection without passive protection. There still remains the rare non-immunisable individual, but it is obvious from the experience so far gained in this war that active immunisation, complemented always by early and efficient surgery, is a pretty sure safeguard against tetanus.

MOVING X-RAY PICTURES

CINERADIOGRAPHY has been the dream of radiologists since 1896, when both röntgen rays and the cinematograph were in their infancy, but despite many ingenious inventions the method has not yet reached the stage where it can be applied to routine clinical work. There are two possible ways of making a radiographic moving picture. The first and most difficult is the so-called direct method where a long strip of X-ray film or a series of single films is moved in front of a selected part of the body and exposed in the ordinary way at predetermined intervals. This method is costly and needs complicated apparatus, and the interval between exposures is too long. In the second or indirect method successive photographs are taken of the image on the fluorescent screen. Since the light value of a fluorescing screen is very low the problems of this method of cineradiography resolved themselves into securing a wide-aperture lens of suitable focal length, increasing the luminosity of the screen, and increasing the sensitivity of the film. The optical problem has been solved by the development of the Zeiss R-Biotar *f* 1 : 0·85 lens. Unfortunately increasing the luminosity of the screen or the sensitivity of the film results in loss of detail, because the former necessitates the use of a broad focus tube and the latter the use of coarse grain film. Workers in different countries have approached these difficulties along different lines. In England RUSSELL REYNOLDS[1] increased the luminosity of the screen by increasing the output of the X-ray tube. This entailed overloading a broad focus tube and exceeding the tolerance dose of X rays to the patient. But REYNOLDS introduced a circuit breaker which automatically cut off the X rays as the shutter in the cine-camera closed. He thus eliminated danger to the patient and was able to use a less broad focus tube with fine grain film. Even then his maximum speed for cardiac work was only 25 frames per second, he was limited to a field of fixed size and the patient had to be in the erect position. STEWART, HOFFMAN and CHISELIN[2] in America, TORELLI[3] in Italy and KAWAISHI[4] in Japan used the same lens as REYNOLDS but employed a fine focus rotating anode tube with exposures well within the tube limits and the skin tolerance dose, and compensated for the low light value by using ultra-sensitive coarse grain film. The larger the grain of the film emulsion the less the detail, so what was gained by the fine focus tube was lost by the coarse grain film. Like REYNOLDS these workers had to use a field of fixed size in one position.

Lately DE CASTRO and JANY[5] of Brazil claim to have devised a camera attachment which overcomes the outstanding difficulties and a method of hypersensitising fine grain film which enormously increases its speed without corresponding loss of detail. The apparatus consists of an expanding leather bellows, light tight and damp proof. The large end of the bellows is hermetically closed by a fluorescent screen. At the small end is a lead-lined case holding the cine-camera. The bellows is supported on a tubular telescopic structure which allows the bellows to be expanded from 50 cm. to 2 meters in length. The telescopic support has a metric scale on which the distance between the camera and the screen can be quickly measured. By turning the helicoidal thread on the lens to the corresponding distance on the external tube, the camera is automatically focused. The sides of the lead-lined camera box are hinged so that there is free access for winding the camera and regulating the speed. An electromagnet attached to the rear wall of the camera box allows the operator to start or stop the film from a distant control table. This apparatus is attached to a standard motor-driven tilting table. The exact method of attachment is not described but it is said that it can be put together or dismantled in a few minutes. The device maintains the tube, the patient, the centre of the screen and the optical axis of the camera in perfect alignment. The camera can be moved nearer to or further from the patient during the exposure and the tube can also be moved backwards and forwards during the exposure. Lateral and rotary movements of the tube are also possible and remote control of the motor which drives the couch permits of the patient being moved from the erect to the Trendelenburg position during the exposure. All the operations are carried out in daylight and the whole apparatus can easily be adapted for seriography, tomography and mass radiography.

The Brazilian workers—radiologist and engineer—came to the conclusion that the only way to obtain adequate speed and detail was by increasing the sensitivity of fine grain film. Hypersensitisation of film was attempted by DAGUERRE and film manufacturers have been experimenting with it ever since. The principle consists in exposing the film to substances such as ammonia or mercury vapour shortly before it is used. Up to the present no way has been found of accurately controlling this process. JANY now claims to have done so but does not describe his technique. He combines the action of mercury vapour with "several amalgams" and says that the hypersensitising should be done "in a glass jar, hermetically sealed and maintained at a constant temperature during a certain period, depending on the composition of the ingredients which constitute the photographic emulsion." With hypersensitised fine grain film and the apparatus described, the Brazilians claim to make cineradiograms safely and easily with detail nearly as good as full size film. By hypersensitising coarse grain fast film they claim to take slow motion pictures of the heart at 64 frames a second. Details of the hypersensitising

1. Reynolds, R. J. In Text-Book of X-Ray Diagnosis, edited by Shanks, S. C. Kerley, P. and Twining, E. W. London, 1938.
2. Stewart, W. H., Hoffman, W. J. and Chiselin, F. H. *Amer. J. Roentgenol.* 1937, **38**, 465.
3. Torelli, G. *Ann. Ist. Carlo Forlanini*, 1939, **3**, 1, 160, 383.
4. Kawaishi, K. *Amer. J. Roentgenol.* 1938, **40**, 913.
5. de Castro, J. M. and Jany, J. *Rev. paul. Tisiol.* 1942, **8**, 110.

process will be awaited with interest by all radiologists. If the method is simple and gives constant results, this is an important contribution not only to cineradiography but also to mass radiography.

MORPHIA AFTER INJURIES

UNTIL lately it was the practice to prescribe morphia for shock as if it was some specific remedy. The larger the wound or the greater the shock the larger was the dose thought necessary. And the doctor felt satisfied that whatever arguments there might be about the other methods of treating shock morphia in full doses had the blessing of the textbooks and experts. Gradually during this war there has emerged the view that not only is morphia often unnecessary after injuries but there are definite dangers from its excessive use. The *Army Medical Department Bulletin* for October says that morphia is given to many wounded patients who would do better with a cup of tea. It also reminds the medical officer that the ideal is to give the smallest dose that will be effective, and that, though gr. $\frac{1}{2}$ is reasonable for the severe injury with much pain and distress, after this dose no more should be given for at least four hours. In the shocked patient poor absorption may lead to disappointing results from subcutaneous morphia and the intramuscular route is preferable. If rapid relief is required, gr. $\frac{1}{6}$–$\frac{1}{4}$, but never more, diluted to at least 1 c.cm. with sterile water, may be injected intravenously, taking a minute or more over the injection. Intravenous morphia can often be given by injecting it through the rubber tubing (cleaned as if it were skin) of the plasma or blood drip that the patient is having; the ready made sterile solutions such as 'Omnopon' or 'Alopon,' which remain stable in solution, are convenient for this purpose. When injection is impracticable one or two gr. $\frac{1}{4}$ tablets work well if placed under the tongue. The pharmacology of this practice is still doubtful. With morphia, which is not acted on by gastric juice, it does not matter much whether absorption takes place through the buccal mucous membrane or lower down, but it would be worth while settling this question once and for all by some properly controlled experiments.

In shock, the fall of blood volume reduces the transport available to carry oxygen to the tissues, and the aim must be to supply the needs of the vital centres by restricting the oxygen consumption of the less important tissues, such as the voluntary muscles. Morphia does this by allaying the restlessness, due to pain, hæmorrhage or anxiety, and by damping down cell metabolism. The use of morphia thus appears to be sound rational therapy. But morphia also depresses the respiratory centre, so that breathing becomes both shallow and slow, and the consequent reduction in oxygen intake will add to the difficulties of the vital centres. The shallow breathing also reduces the efficiency of the respiratory suction pump, so that the venous return is slowed. There are other effects to be remembered. With the low blood-pressure of shock the additional use of morphia may lead to cessation of urinary secretion. The patient after large doses of morphia is almost poikilothermic, and has to be carefully guarded against changes of temperature. Nevertheless, GRANT[1] has never seen bad results from gr. $\frac{1}{4}$, and he says that when injured patients are in pain their low blood-pressure will rise to normal levels as the pain is eased by the drug. He reminds us, however, that repeated injections may lead later to massive absorption as the circulation recovers and that chloral and bromides should not be forgotten. NOSWORTHY[2] finds that by giving scopolamine with a much smaller dose of morphia the respiratory depressive effect of morphia can be avoided. The neurosurgeon insists on the minimal amount of morphia for head injuries—certainly not more than gr. $\frac{1}{4}$. The restlessness associated with head injury is better controlled by raising and padding the sides of the bed, and ROWBOTHAM[3] recommends phenobarbital gr. 3 intravenously followed by chloral hydrate and bromides by mouth or rectum. The chest surgeon finds that large doses of morphia postoperatively, after a chest injury, lead to lung collapse; within limits, the more these patients are made to move and not "mollycoddled," as PRICE THOMAS puts it, the better. Thus the practice of using morphia as a routine postoperatively, for every injury, and for shock or suspected shock, needs checking. Pain, and restlessness due to anxiety or hæmorrhage are the true indications.

1. Grant, R. T. *Proc. R. Soc. Med.* 1942, **35**, 445.

AUSCULTATION UP TO DATE

IN what he calls by the rather cumbersome name of a phono-electrocardioscope, G. E. Donovan has introduced an instrument which holds out high promise of useful service to the clinician and medical student, as well as to the research worker. As he described it in a lecture to the Institution of Electrical Engineers, the instrument incorporates a double-beam cathode-ray oscilloscope with a fluorescent screen of long afterglow, which permits of the simultaneous direct visual recording of two phenomena such as the phonocardiogram and electrocardiogram, the phonocardiogram and sphygmogram, or the electrocardiogram and sphygmogram. At the same time the heart sounds, picked up by a special microphone, can be heard through an electrical amplifying stethoscope or a loud-speaker. The instrument seems reasonably simple to work, and it is claimed that it is robust, cannot be damaged by overloading or shock, and that maintenance is simple. A further advantage is that permanent photographic records can be obtained of the phonocardiogram, electrocardiogram or sphygmogram. By means of frequency filters, murmurs or desired sounds can be accentuated and undesirable ones muted. The instrument has an overall frequency range extending from the lowest frequency to over 1000 cycles per second, but this band can be divided by means of filters so that the frequency response of the apparatus can be given any desired slope, as is done by the "tone control" of a wireless set. The most obvious application of the phono-electrocardioscope is in the teaching of auscultation. Donovan says that the amplifying of heart sounds through a loud-speaker can never be 100% satisfactory; he much prefers multiple headphones, which can, of course, be used with his instrument. It seems to be possible with this instrument for a group of students to hear (and see) the sounds actually produced by the heart, including those not audible to the human ear with the ordinary stethoscope, as well as the sounds and murmurs, reasonably amplified, which he should be able to hear with the simple stethoscope. At the same time they will have visible evidence of the correlation of these sounds with the various phases of the cardiac cycle as demonstrated by the electrocardiogram. Of the usefulness of the instrument in the clinic and the research laboratory there can also be little doubt.

2. Nosworthy, M. D. *Ibid*, p. 452.
3. Rowbotham, G. F. Acute Injuries of the Head, London, 1942, p. 114.

Annotations

DEATHS IN THE THEATRE

FEW statistical inquiries are less satisfactory than those which seek to establish the relative safety of different anæsthetics. If it were possible for identical anæsthetists to give different anæsthetics in measured dosage to identical subjects undergoing identical operations by identical surgeons comparisons might be just; but it is not. Three Johns Hopkins workers,[1] in an analysis of deaths in the theatre, lay little stress on this kind of comparison, though they do give percentage mortalities for the various anæsthetics used; actually these were not significantly different. Lyford and his colleagues were anxious to determine the incidence of anæsthetic deaths and to see whether some of them might have been avoided. They reviewed the records of 51,392 patients who had been given general or spinal anæsthetics for any surgical procedure except ophthalmic and obstetric operations during the ten years 1931–41. In this series there were 75 deaths in the theatre, an incidence of 1·5 per 1000 anæsthetics; of these, 55 were not, and 20 seemed to be, related to the anæsthetic. Of the deaths thought to be unrelated to anæsthesia, 29 took place during difficult craniotomies; all the patients were in danger from increased intracranial pressure at the time of operation, and some died from hæmorrhage. A further 16 patients died during chest operations, many of them being critically ill at the time. Of the remaining 10 patients in this group, 6 seem to have died because of their poor condition at the time of operation, and 2 from operative hæmorrhage and shock during extensive surgical measures; one death was associated with absorption of an excess of adrenaline used in an attempt to control bleeding in a frontal sinus operation; the case-history of the last patient in this group was not available for study. Of the 20 deaths which seemed to be related to the anæsthetic, obstruction of the main respiratory passages was held responsible in 4 cases. In 3 this was by regurgitated stomach contents. In the fourth, a hæmophiliac, an intranasal catheter was passed with the patient under 'Pentothal Sodium'; it was thought to have reached the trachea, though it may have stopped short in the pharynx; 15 minutes later the patient showed signs of asphyxia and shortly afterwards died of œdema of the larynx. Another 3 deaths were associated with spinal anæsthesia. In 3 more the technique of administration of an inhaled anæsthetic seems to have been at fault; one was a patient with hypertension and a history of angina pectoris who was given nitrous oxide and oxygen followed by a small amount of ether for appendicectomy. He died about 15 minutes after the start of anæsthesia and may have been short of oxygen throughout. In the second case there was an inaccuracy in the flow-meter of the closed nitrous-oxide circuit which resulted in him getting 20% less oxygen than was supposed. In the third case the patient responded badly to the anæsthetic (nitrous oxide and oxygen followed by ether); he might have survived if operation had been delayed until a satisfactory anæsthetic state had been achieved. Another patient was receiving nitrous oxide, oxygen and ether for incision of a carbuncle; a cautery was used to check bleeding when in some way the anæsthetist received an electric shock through the patient and dropped the mask. The anæsthetic mixture thereupon exploded and killed the patient. In the remaining 9 cases no adequate explanation of the deaths could be found, though the poor condition of the patients was thought to be contributory in 4. The conclusion is that 11 deaths in the series could have been avoided—the 4 due to obstruction of the air-passages, the 1 due to explosion, the 3 due to faulty technique and the 3 due to spinal anæsthetics. The gross anæsthetic mortality in the series was 0·039%, which is in line with rates reported by other observers.

1. Lyford, J., Berger, O. L. and Shumacker, H. B. *Bull. Johns Hopk. Hosp.* 1942, **70**, 488.

RESEARCH IN SOUTH AFRICA

THE South African Institute for Medical Research has a reputation for work of distinction; in the report for 1941 the brief account given by Prof. E. H. Cluver indicates that the standard does not fall. The institute has turned its attention to war problems; Dr. J. H. S. Gear, whose work on typhus is well known, has been appointed to supervise the preparation of yellow fever vaccine after tuition in New York by members of the International Division of the Rockefeller Foundation. Yellow fever exercises the African health authorities especially since its recent extension to the Sudan and Uganda; that the Union is within the sphere of possible spread is shown by the finding of the common vector, *Aedes ægypti*, at many points in the Transvaal, Natal and Cape Province. But the existing records of this mosquito have been made principally in malarious country where mosquito collecting has been carried on; its actual range is certainly greater than present information indicates. Malaria, of course, exists in the Union; Dr. B. De Meillon, who has wide entomological experience in the Union and Mozambique, has studied the properties of mosquito-repelling mixtures for use by the South African Forces. Citronella is effective, but coumarin also shows great possibilities. In an extensive trial, Dr. E. Grasset and Dr. A. R. Davison, like workers elsewhere, have failed to confirm the good results reported by Collier in Thailand on the treatment of leprosy with diphtheria toxoid. Pneumonia is a subject which the institute has long studied intensively because of the heavy incidence and high death-rate in the past among native mine workers of the Rand. Dr. D. Ordman has continued the bacteriological investigations initiated some 20 years ago, and it is on the basis of these, which display the shifting ætiology of the condition, that the wide system of prophylactic immunisation is based. Sulphonamide therapy is of course largely used, but cases resistant to sulphapyridine are still cropping up; most of them are associated with *Staphylococcus aureus*, either as the sole infecting agent, or together with pneumococci or other organisms. During 1941 the commonest pneumococci found in pneumonia were of types 1 and 2. Routine examination of lungs for silicosis and tuberculosis is made for the Miners' Phthisis Medical Bureau; the numbers submitted were slightly higher than in the 2 preceding years. Ordman has undertaken the preparation, on a large scale, of vaccines against typhus of the classical louse-borne type, murine typhus, and tick-bite fever (a tick-borne member of the typhus group). Immunisation may prove a more effective means of controlling these diseases than any other; in the meantime the value of the vaccines has not fully been investigated in man, though that against the tick-borne form may give satisfactory results if it is as potent as the Rocky Mountain fever vaccine.

Ordman's activities included the investigation of an outbreak of relapsing fever, a disease first reported from the Union in 1912 by Park Ross; there were no further records until 1932, since when cases have been found in the northern Transvaal. In the 1939 report de Meillon recorded it in the high veldt of the Transvaal, where it was associated with the presence of *Ornithodorus moubata*, the common vector of tropical Africa. Ordman[1] finds that the spread of *O. moubata* may in part be attributed to the fact that men of the Angoni tribe of Nyasaland, when travelling away from their own country, take with them a supply of these ticks, believing that immunity from relapsing fever can only be maintained if they are bitten by the ticks from time to time. The African is

1. *S. Afr. med. J.* 1941, **15**, 383.

capable of acute observation, and perhaps on such a foundation it will not be difficult to build a faith in the modern prophylactic immunisation for the growing number of diseases for which it is advised. Plague, for instance, is no small problem in the Union, and Grasset has already placed the preparation of live avirulent plague vaccine on a routine basis. He uses both the Tjiwidej strain from Java and the EV strain from Madagascar; these two avirulent strains of *Pasteurella pestis*, used in the living state, have acquired great reputations. He has also developed combined immunisation against the typhoid group and tetanus. Several cases of tetanus have arisen in men working in one particular mine shaft; soil from this mine was found to contain spores of *Clostridium tetani*, though samples of water were negative; investigations are in progress.

Cancer has occupied the attention of Dr. M. J. A. Des Ligneris; to help in the discovery of predisposing factors he suggests that every member of the community should be provided with a detailed clinical history-sheet, forming a complete record from birth till death; this would help to elucidate not only the problem of cancer but that of many other conditions too, as practitioners in Britain will agree.

FATIGUE FRACTURE OF THE TIBIA

A CONDITION in the tibia analogous to march fracture of the metatarsal bones has been found in X-ray examinations of children and adolescents complaining of pain around the upper end of the tibia or in the calf, and Hartley[1] has drawn attention to it as a potential cause of disability in young recruits. Not only may a fatigue fracture of the tibia seriously interfere with training, and especially with marching, but when it is undetected slight violence may produce a complete fracture and long disablement. In one such case observed by Hartley the subsequent fracture has led to the soldier's discharge. Altogether he records 14 cases of fatigue fracture, in all of which the lesion was at the upper end of the shaft of the tibia, the site varying with the age of the patient from 1½ to 3¾ in. below the epiphysial line. The clinical history is usually of pain on standing, on walking, or after walking, with no history of injury. The pain disappears when the limb is at rest. Bilateral cases have been noted, but the pain has not been present simultaneously in both legs. In 5 patients slight swelling was detected on the inner aspect of the upper end of the tibial shaft. There was no local reddening or pyrexia, and tenderness was present only in 3 instances. The patients came for radiographic examination 10–21 days after the onset of symptoms. If the limb is rested completely spontaneous cure is certain; it occurred in every one of Hartley's cases. The diagnosis rests entirely on the X-ray findings. A small area of callus is seen in the lateral view behind the cortex at the upper end of the tibial shaft; in the anteroposterior radiogram callus is usually visible on the medial aspect of the tibia, but sometimes on the lateral aspect. A tiny nick is also seen in the cortex of the bone, medially, laterally or both. Later pictures will show an area of osteoporosis extending forwards from the posterior area of callus, sometimes with a fine irregular line of dense bone, the width of a hair, in its centre. Rest increases the callus and causes sclerosis of rarefied bone. In the healed fracture the posterior callus may have become organised into a bony buttress. The radiological appearances may be definite within a fortnight of the onset of pain, but if uncertainty exists the examination should be repeated after another 7–14 days; absence of the typical appearances then is definite evidence against the diagnosis. If a true fracture takes place at this particular site in the tibia, especially from slight violence, the radiogram should be carefully examined for callus. If this can be demonstrated in a fresh fracture it must have occurred through an area weakened by fatigue fracture. In Hartley's opinion the fatigue fracture is essentially a fatigue dystrophy, unassociated with inflammation or with direct violence. He regards the upper end of the tibia as subject to considerable strain, a fact which he thinks is demonstrated by the architectural structure and buttressing seen in normal radiograms. Faulty crystalline structure, abnormal strain, or a combination of both at this vulnerable site causes the bone to give way. Hartley urges the importance of diagnosing fatigue fracture early in young patients, so that treatment by immobilisation can be begun before time has been wasted and the patient exposed to the danger of a severe fracture.

1. Hartley, J. B. *Brit. J. Surg.* 1942, **30**, 9.

RABBIT DISEASES

THE Ministry of Agriculture, in two succinct bulletins,[1] has summarised what the vast new body of rabbit keepers should know about the feeding and diseases of rabbits, and Gordon[2] has given more details about their diseases. In the control of disease much depends on good husbandry; newly purchased stock must always be isolated, hutches kept clean and manure never placed on ground that will be used to grow rabbit food. The individual is usually sacrificed to prevent the spread of disease to other animals; unless there is some effective specific treatment affected animals should be destroyed and burned, and thorough disinfection of the hutches carried out. Tuberculosis, most commonly from the bovine strain and acquired through infected cow's milk, affects rabbits, but does not as a rule assume epidemic proportions. Pseudo-tuberculosis, caused by *Pasteurella pseudotuberculosis rodentium*, is an infectious disease closely resembling tuberculosis both clinically and pathologically, and is usually fatal after a 3–4 weeks course of progressive emaciation and weakness. Snuffles, or contagious catarrh, can be one of the most serious diseases in rabbitries; it can be acute but is more often chronic, and would pass for a persistent cold except for the accompanying wasting. The cause is not established. *Fusiformis necrophorus* infection (Schmorl's disease) produces necrosis and ulceration of the skin, particularly of the face and head, and thickly walled abscesses in different parts of the body. Affected animals move their jaws with difficulty and may develop pleurisy and pneumonia. A condition in which a large abscess due to streptococcal infection develops in the region of the lower jaw is termed strangles. The abscess should be opened and careful hygienic precautions observed. Hæmorrhagic septicæmia is caused by *Pasteurella cuniculicida*; animals die within 24–36 hours and exhibit the usual symptoms and post-mortem lesions of an acute septicæmia. Vent disease (rabbit syphilis), a venereal disease caused by *Treponema cuniculi*, is common in the rabbit but is less serious than human syphilis; affected animals have small scaly sores on the genital organs and when these are observed mating should be prevented. The disease responds to the local application of mercurial ointments or the injection of neosalvarsan; it is not transmissible to man. Coccidiosis affects rabbits in two forms—the hepatic, caused by *Eimeria stiedæ*, and the intestinal, caused by *E. perforans*. Many adult rabbits are carriers. In the most acute case—of the type which kills 70–100% of a litter—death occurs suddenly with no previous ill health and often no post-mortem lesions, although oöcysts can be demonstrated in liver preparations. In less acute cases diarrhœa is usually followed by coma or convulsions immediately before death. Adults develop progressive emaciation, pot-belly, and weakness of the hind legs. Multiple white nodules are found in the liver or intestine,

1. Modern Rabbit Keeping Bulletin No. 50 of the Ministry of Agriculture. HMSO. 1s. Some Diseases of Rabbits. Bulletin No. 14 of the Ministry of Agriculture. HMSO. 3d.
2. Gordon, R. F. *Vet. J.* 1942, **98**, 152.

and the bile-ducts may be seen as irregular white streaks on the surface of the liver. The oöcysts which are passed with the fæces in both forms of the disease, and can be demonstrated microscopically, are not infective until at least two days after being passed. In prevention, therefore, animals kept in runs should be moved on to clean grass every two days. Food and water must be kept clean, and wire-floored hutches are useful. All members of an affected litter should be killed, the bedding and droppings burnt, and the hutch scrubbed with 4% washing soda and then disinfected with a 10% solution of household ammonia. Recently a disease, clinically rather similar to acute coccidiosis, has been prevalent in young rabbits. Usually the rabbit is simply found dead, but there may be a few hours paralysis or convulsions before death. It may be caused by a virus, but its ætiology is still being investigated at the Ministry of Agriculture Veterinary Laboratory, Weybridge. Control measures as for coccidiosis should be carried out. Rabbits are liable to favus and ringworm, the appearances and treatment being as in man. Skin mange, produced by two kinds of mite, is particularly infectious and only valuable animals should be treated. Ear mange or canker, also due to two mites, and leading to a violent otitis externa, may be treated with hydrogen peroxide to remove scabs, followed by a mixture of olive oil 20 parts and cresol or carbolic acid 1 part. Benzyl benzoate preparations would probably be more effective. Internal parasites of the rabbit are not important but the bladder-worm stage of the dog tapeworm *Cœnurus serialis* may cause subcutaneous swelling. The cyst can be surgically removed and then destroyed.

DIURESIS AND LACTATION

IT has been the fashion to regard the initiation of lactation in terms of an antagonism between œstrogen and prolactin, or perhaps it would be preferable to say of a balanced endocrine relationship between the ovary and anterior pituitary. This view, which carries the implication that sufficiently high doses of œstrogen exert an inhibitory effect on lactation, has been questioned by Meites and Turner[1] principally on the basis of their finding that the prolactin content of the anterior pituitary is not decreased but increased as a result of œstrogen administration. This increase they look upon as indicative of an increased production of prolactin, which is taken to be a decisive factor in the initiation of lactation. This contention, however, rests on the premise that prolactin is the specific lactogen hormone, a view which was severely criticised by Folley and Young[2] and which Turner[3] himself has lately seemed compelled to abandon. Assuming that what may be called the œstrogen anterior pituitary antagonism theory is true, deficiency in lactation can be conceived, in many cases, as being due to a disturbance in the ovary-pituitary balance in the direction of a predominance of œstrogen. Hypogalactia could then be treated in one of two ways—by administering anterior pituitary extracts or by measures which decrease the concentration of circulating œstrogen. Hitherto the former method has been used almost exclusively, with varying and often disappointing results. This is hardly surprising when it is remembered that purified preparations of prolactin (the pigeon crop-gland stimulating factor) have been used in these trials and that Folley and Young[2] have pointed out that prolactin is only one of a complex of anterior lobe factors concerned in the initiation and maintenance of lactation. Moreover, pituitary therapy, always expensive, has owing to war conditions become virtually impossible in many European countries. Hence Geisendorf and Neyroud[4] of Geneva have been led to treat cases of deficient lactation by trying to hasten the post-partum fall in the level of circulating œstrogen by the administration of the diuretic theophylline, the resulting increase in urine flow, they say, causing a rapid elimination of œstrogen from the body. At first one ampoule containing 0·48 g. of theophylline ethylenediamine was injected intramuscularly within two hours of parturition, but as these injections were painful the later cases received two 0·36 g. suppositories during the twelve hours after parturition. Their results in a large series, while possibly not fulfilling the exacting requirements of the modern statistician, are suggestive of success. Clinicians who view with alarm the present decline in breast-feeding, and whose hopes of endocrinology providing them with a panacea for lactational deficiencies have hitherto been disappointed, might give the method a trial. If the Swiss results are confirmed the position of the œstrogen inhibition theory will be strengthened.

1. Meites, J. and Turner, C. W. *Endocrinology*, 1942, **30**, 711, 719, 726.
2. Folley, S. J. and Young, F. G. *Lancet*, 1940, i, 380.
3. Hurst, V. and Turner, C.W. *Proc. Soc. exp. Biol. N.Y.*, 1942, **31**, 334.

ARTERIAL LIGATURE FOR DUODENAL ULCER

THE general poverty of the few foodstuffs available in Southern India are such that no treatment involving special diet over a long period is feasible. Food there means rice and curry or tapioca and curry. Working in this area, Somervell[5] therefore operates on the vast majority of duodenal ulcers, and in the last 20 years has done 2000 such operations. He looks on the fractional test-meal in these cases as the most valuable guide to operative procedure and divides the acid curves in duodenal ulcer into four types—(1) high acid; (2) moderately high fasting acid rising to a high level in two hours; (3) very high fasting acid rising but slowly after the meal; and (4) high normal acid. For the fourth type he advises gastroenterostomy alone, but in the others he now combines it with ligation of gastric arteries—"a kind of physiological gastrectomy, designed to reduce acidity promptly." Under procaine infiltration of the abdominal wall, reinforced if necessary by splanchnic anæsthesia, he begins on the greater curvature about two inches from the pylorus and proceeds to tie four out of every five arteries that he comes across until a point high up on the curve is reached. The same process is then carried out on the lesser curvature. Finally, through a window in the mesocolon he delivers as much of the stomach as possible and ties off four-fifths of the greater curvature arteries on the posterior aspect which have not been tied already, and all the lesser curvature arteries which, without distressing the patient, can be persuaded to appear at the hole in the mesocolon. A posterior gastroenterostomy is then performed. Somervell remarks on the peculiar facts that the stomach can be deprived of enough of its blood-supply to put oxyntic cells out of action without interfering with its other functions, and that the cells so treated will fail to secrete acid for at least 2½ years. The test-meal charts he publishes show a great and immediate reduction in acidity after this operation. Thus in 10 cases before operation the total acidity of the fasting juice was 79, the average acidity throughout two hours was 70 and the maximum acidity during the two hours 94; three weeks after operation these figures had fallen to 52, 45 and 64; a year later they had fallen further to 29, 39 and 61. Ligature, in Somervell's experience, produces a more rapid fall in acidity than gastroenterostomy alone, though the late reduction is much the same; he is therefore more fortunate than most in reducing acidity with gastroenterostomy alone. In 2 out of 3 cases in which ligature alone has been done a satisfactory fall in acidity was obtained. He has so far ligatured the vessels in 150 cases, with no mortality, and is very satisfied with the results.

4. *Helv. med. Acta*, 1942, **9**, 367.
5. Somervell, T. H. *Brit. J. Surg.* 1942, **30**, 113.

SINUSITIS AND THE COMMON COLD

R. M. DOWDESWELL, M D CAMB
MEDICAL OFFICER, KENYA COLONY MEDICAL SERVICE

THE differential diagnosis of the conditions included under the term "common cold" is still vague and the treatment adopted is therefore apt to be uncertain in its direction. There is a particular tendency to overlook the part played by sinus infection in producing the symptoms.

Wynn (1942) divides common colds into two groups. The first, primary colds, are due to a virus infection, and were found by Dochez, Mills and Kneeland (1936, 1938) to be unaccompanied by rise of temperature. The second group, secondary colds, are due to infection with the usual catarrhal bacteria which have become established in the tonsils, sinuses, nasopharynx, &c. after primary colds. The secondary colds are those mostly seen in practice because the primary ones are soon over. Jackson and Coates (1930) say that the attempt to differentiate between a sinusitis and an acute coryza or rhinitis "is more or less of a sophistry, the severe cold being called a sinusitis and the mild one a coryza." StClair Thomson and Negus (1937) say that acute sinusitis "forms a part of many acute catarrhs which invade the sinuses by direct extension from a nasal catarrh."

The typical symptoms of sinusitis of course vary according to which sinus or sinuses are affected; many attacks produce no more than a "cold." In the chronic condition there is little tendency to spontaneous recovery. Among the symptoms of chronic sinusitis given in the textbooks are catarrh, nasal obstruction, chronic cold in the head, a discharge sometimes so slight that patients have unconsciously swallowed it for years, headaches, acute and chronic laryngitis, asthma, bronchiectasis, lack of power to concentrate, lassitude, and even mental abnormalities. Ross Faulkner (in Jackson and Coates's textbook) writes: "Many a person has gone through life as a chronic invalid, labelled a neurasthenic or hypochondriac, from an unrecognised pus focus in the nasal sinuses."

SIXTY CASES OF COMMON COLD

Study of 60 cases of common cold seen in private practice yielded some suggestive results. In this series, 39 patients had only occasional heavy colds or attacks called influenza; in 7 of these a definite diagnosis of sinusitis had been made at some time by the accepted methods. The remaining 21 patients had frequent or chronic heavy colds, and of this group a diagnosis of sinusitis had been made in 6. Only 3 of the diagnosed cases of sinusitis had had operations performed for this condition.

The patients in the "occasional" group all showed one or more of the following symptoms: chronic postnasal catarrh; frontal, occipital or one-sided headache; sneezing attacks; nasal discharge worse on one side and more copious either on standing up or lying down; tenderness over a maxillary or frontal sinus; pain in a sinus when the patient attempts to breathe in with the nose or mouth closed; slight swelling over a sinus; mild fever; lassitude and aching of limbs; minor facial neuralgia.

Cultures from the nasal discharge of patients with recurrent colds have shown more or less normal flora (usually *Staphylococcus albus* and diphtheroids) when taken between attacks, but have yielded a heavy, pure or almost pure culture of a bacterium when taken during an attack. Organisms found in order of frequency have been: *Pneumococcus*, *Staph. aureus*, *Streptococcus viridans* of different types, and Pfeiffer's bacillus. The same organism was recovered in pure culture during separate attacks of a severe cold at intervals of many months from the same patient; in one case a *Pneumococcus*, type II, and in another Pfeiffer's bacillus. Two patients, both doctors, when examined by an ear, nose and throat specialist and radiographed during a clinical attack, proved to have had a long-standing chronic sinus infection which had never been suspected; they claimed to have been free from colds for years. In several cases giving a history and symptoms strongly suggestive of recurring sinusitis, X-ray examination showed no evidence of sinus infection.

In a case diagnosed as frontal sinusitis a mixed culture was obtained before and after one acute attack. A pure growth of *Staph. aureus* was recovered during the attack. Towards the end of this attack a slight diarrhœa was noticed; culture of stool yielded *Bacterium coli* and *Staph. aureus* in roughly equal numbers. As it happened, a stool culture had been taken shortly before the acute sinusitis and had shown no staphylococci, and they were also absent from specimens taken after the attack.

Two patients, a husband and wife, had the wife's sister staying with them. The sister (who is not included in this series of cases and who had previously suffered from a "frontal sinusitis") developed a cold; a pure culture of *Pneumococci* was obtained from the nasal discharge. Within two weeks the husband and wife also developed colds; cultures from one yielded pure Pfeiffer's bacillus and from the other pure *Pneumococci*. The husband had on two previous occasions, 7 and 16 months before, yielded pure cultures of Pfeiffer's bacillus from his nasal discharge during a cold.

DISCUSSION

Some say that it does not really matter if a disease that resembles influenza is called influenza, acute sinusitis or something else. It might almost as well be said that it does not matter whether typhoid fever is called typhus or smallpox called chickenpox. If sinusitis passes as influenza the chances of curing an early attack, checking the spread of infection and of avoiding chronicity and possibly serious complications are much reduced.

Crooks and Signy (1936), Carmack (1931), and Mollison and Kendall (1922), as a result of routine antrum puncture in children, have reported infection in these cavities in 22–30%. Ebbs (1938), as the result of post-mortem examinations on children, reported sinus disease in 30·6%. During childhood the frontal and ethmoid sinuses are only being developed and are less liable to obstruction than the adult sinus. Sinusitis is therefore probably much commoner in children and adults than is generally recognised. The diagnosis of acute and severe sinusitis is not difficult. After recovery from the acute attack X rays may show a clear sinus; this is not proof that no latent infection remains. A negative X-ray picture is evidence only of the absence of an empyema or of gross mucosal changes. The diagnosis of sphenoidal sinus infection is not so easy and its importance in relation to mental disease has been emphasised by Pickworth (1934) who brought evidence to show that infection may remain latent for years in the mucosa and even in the bone.

SUMMARY

Infections of the accessory nasal sinuses are prevalent in childhood as well as in adult life, and are often diagnosed as recurrent colds.

Case-histories and bacteriological findings suggest that apart from unmistakable cases of sinusitis, many are only mild and others have exacerbations of a chronic latent infection with possibly long quiescent periods; and that primary mild sinusitis may remain as a latent infection.

The possibility of sinusitis should be seriously considered and the sinuses investigated in any case of pyrexia of unknown origin, influenza or febrile catarrh.

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CORRIGENDUM.—On page 418 of the article by Mitchell and Buttle (Oct. 10), for "Anderson (1940) found that 1/10,000 solution . . ." read "Stephenson (1940) found that 1/1000 solution. . . ." The corresponding reference should read: "Stephenson, D. (1940) Personal communication."

In England Now

A Running Commentary by Peripatetic Correspondents

I HAVE eighty cases of home-sickness here, old men evacuated from London. They sit on the beach and hear the clutter of streets, they gaze out over the North Sea and dream of the Hackney Road. Clearly the disease is pretty common in our animal world; it has anchored the ancient civilisations of the ants and bees, it is the motive of the migrant and the homer, and territoriality is its mainspring; it occurs more strongly in the young and the old or when there is need of protection as in illness and at nightfall; in the virile it alternates with wanderlust which is its manic form; it is the call to the beast from the earth that bore it. In essence nostalgia, this return-pain, consists in a longing for home expressed in mental tastes, touches, smells, sounds and pictures, the whole composite animal thought-form.

Even in man, who is degenerate in these respects, home-sickness retains a large element of taste, smell and touch, whose proportions vary at different ages. The very young child longs for a person, his mother or his nurse, and the order of precedence here would probably be touch, taste (including a feeling of repletion), smell, hearing, sight—the "lower animal" sequence. At prep-school-going age, if the composite thought-form were put in words, the items in order of prominence might be something like this: the house itself and its protecting personality, the birds' egg collection, the smell of the kitchen and the feeling after a good illicit meal, the feeling of being in bed and hearing the rain on the ivy, my rabbits, the feel of the lawn to bare feet, my mother and father, the hole in the shrubbery which I am going to make into a real cave and the smell and the gloom of it, John's ferret, the acorns I planted in the field, my sisters. Later on the sisters may move up and be bracketed with the ferret, and the parents may take precedence over the rabbit. Later on still it tends to be more diffuse—a longing for particular towns and counties. Going on the long route round the Cape in the last war I used to walk up and down the deck with a London addict and sometimes he used to pretend we were walking from, say, Westminster Bridge to the Mansion House, and he discoursed on the streets and houses we were supposedly passing. Then I would remember that when I used really to walk those same streets I was dreaming of Essex fields and elms. It often beats logic, it will make a child return on the first day of a holiday she has been saving up for and talking about for months, and it packs people back to bad homes and bombed areas. I once knew a Lewis Islander who got a very good job in the middle of Queensland, but he chucked it up as he was getting ill—he told me he could hear the sea breaking even in the Ford. Some exiles may tell you they never get home-sick now; then suddenly comes a smell of bracken or of peculiar dust associated with some squeaky chair or room, and they have to answer quickly, for it is home calling on the old nasal line. One never quite gets over it, thank Heaven, for although it can be devastating at times, on the whole it is a poignantly pleasant disease, moreover it is the strength of families and adhesive of nations. There is only one cure—to go home—and it is a solacing thought, quite in keeping with the morbidness of the disease, that we shall all be cured at the great home-coming, when we return to dust.

* * *

The credit for the following important discoveries in the rapidly growing field of homunculology should really go to George, my friend in the Army. One day in the mess, after a particularly wearying sick parade, he was brooding tensely on philosophical questions, to the accompaniment of a steady flow of gin and limes (or gins and lime), when the light broke in on him. "Of course!" he exclaimed, making the Padre choke over his beer. "It's obvious, when you think of it! The Old Woman Who Lived in a Shoe wasn't a myth at all—she really lived, and all those children she didn't know what to do about are the ancestors of the Little Men Who Live in Army Boots! Why they should prefer Army boots is incomprehensible, but they do. Every man I saw this morning was firm in his statement that he had never suffered from the machinations of these little fellows when he wore civilian footwear, but that now he is a martyr to them." George stopped for breath, and in the pause the Colonel was heard to remark coldly that though not a doctor himself he had always considered excessive consumption of alcohol in the early part of the day unhealthy.

The Major, whose cardiovascular homunculi had in the past few minutes screwed down the safety-valve and opened the throttle wide, now gave tongue in his usual bluff military manner. "Rubbish! Nonsense! You doctors are far too soft-hearted! Little Men, indeed! It's all lead-swinging, in my opinion. Why, out in India we used to march 50 miles a day, and no sick parades! Regulars, of course. Grand fellows! But of course the Army wasn't permeated with all this new-fangled Air Force stuff in those days. They tell me the Air Force is full of these Little Men ideas—Gremlins, they call them—petrol-drinking Gremlins, sight-twisting Gremlins, Gremlins that breathe on the wind-screen and put dirt in the guns, and so on! But what can you expect in a Service with no traditions?"

The Major continued in this strain for some time, but George was too full of his discovery and other things to take much notice. *H. vesiculogenicus*, little men with stirrup pumps who pump water into the skin and make blisters. *H. pesplanogenicus* (George's latin, never very reliable, was giving way under the strain), the heavy little men who jump up and down on the arch until they knock it flat. *H.* —— (George's latin had now failed completely), the little men with hammers who live upside down under the inner sole, and industriously drive nails up through it. The bootlace-gnawers and knot-saboteurs are well known, but it is not fully realised, even in the high scientific circles such as George and I revolve in, that march fractures only occur in metatarsals previously weakened by the inroads of little men with pneumatic drills. As George learnedly points out, any damage to the surface of a structure subjected to bending leads to a local stress concentration, with resultant failure under less then design loads. He also suggests that bone may be liable to vibration fatigue, like metals, but this is above me; I prefer the more democratic homuncular theory.

* * *

"Salvage" is a word screamed at me just now from every newspaper and many hoardings, and paper, it appears, is still one of the main articles to be salvaged. It is easy to grasp the difficulties of obtaining wood pulp and the hindrances to its ultimate distribution, so when I try to buy a book and am told that it is out of print owing to paper shortage, or when I am informed that my copy of the *Blanktown Guardian* can no longer be supplied owing to limitation of copies, I am disappointed but not vexed, and try to bear these discomforts with fortitude. However, the information given in a reputable weekly that the circulation of Hedley Chase's books represents a greater supply of paper than a large publishing house used in all its publications for six months does not help me in this effort. Then in a bookshop I visited a few weeks ago there was an enormous display of copies of the most recent effort of a medical colleague now resident in California. It seems that so many copies were printed, presumably on the author's reputation, and so few are being sold that there has to be a special drive to get rid of the surplus. It is a pity that the applications of Salvage should be so anomalous.

* * *

My varther, 'e's a man sem'ty six year old and 'e can take a team o' 'osses and do a day's ploughin' so well's inny-body now. Wan thin 'e can't bide is to yur a man swearin' at a wumman, and you knaws, darcter, as us got some *dridful* neighbours. T'other day the man opposight comes 'ome to 'is dinner and starts orf swearin' and blindin' to 'is missis. Hup gits my varther, goes across to un and cracks un wan on the jaw. Then this yur chap—a man ony thirty-five year old, mind—pushes varther back agin the wall and starts for to pitch into un purty smart. Varther, 'e puts 'is 'and back agin the drang-pipe so's to git a gude shove orf like and springs vorrard, takin' the chap roun' the neck and back and turns un over on 'is arse like wink. Down goes varther

on top of un and wor't let un git up, so the chap ketches 'old o' varther's arm in 'is teeth and bites a lump out's clean as a whip. My varther takes 'old of 'is nawse and starts to twist un. "Hif you bites me agin, you b——," 'e says, "I'll screw your bliddy nawse right orf, sure 'nough!" My brother thinks 'tis 'bout time vor to vetch the Sergeant and orf 'e goes arter un. When they two comes back 'bout quarter'n hour later varther is still sitting atop this yur chap and 'im a man only 'arf 'is age, mind you. Then, top of ivverything, varther goes and summonses un vor assault!

* * *

Great men have their biographers, great virtues a-recording, but today I mourn for one who was not known as great, yet seemed above all others to have the gift of friendliness. When he first came to our camp he was a grubby little boy of ten—might he camp with us? Got a tent? No. Got any grub? No-o. He stayed six weeks, going from one troop to another, acting as guide in the woods and fields, showing town boys the skill of cooking the cockle, of spearing the dab and the flounder, of seeking the samphire. One heard his shrill Doric all day, and like a cluster of sparrows he and his friends moved in a babble of noise, at night reluctantly desisting. He came year after year and was greeted as one whom we had never really left. In winter we would sometimes hear from him, hard fabricated letters, scented with the smell of hayfields and a summer's sea. With foreign scouts his glowing friendliness made him at ease and soon he might have been of their own blood. At the camp just before the war he was seventeen and working, but he came each evening helping in chores, and left soon after dawn. He tried to join the Navy, but was found to be colour-blind, so went into the Merchant Service. Here too his easy friendliness made him as one who had been known to each for all time. On his second trip his ship was torpedoed homeward bound on a winter's night. He was still alive when they dragged him into a boat, but died an hour later and was buried at Stornaway. Throughout his few years he had nothing to offer but life and friendship, but he gave them both and they were gold. His was a genius for aiding, the spirit sung by Kropotkin, which has done more for the advance of man then the skill of craftsmen, the wisdom of statesmen, or the beneficence of kings. O Jimmy, may the reminding cries of the gulls and the sound of northern breakers and the love of many friends bear you peace.

* * *

Today has in a small way been rather a red-letter day for me. I have just given Sam his last pink certificate, for he has now reached the age of 65. Seven years ago he and I decided, rightly I think, that, owing to a combination of chronic bronchitis and osteo-arthritis, he had better give up the blacksmithing. Every lunar month since I have called on him and stated, on the pink certificate provided for the purpose, that, in my opinion, he was not likely to be fit for work for a further period of 4 weeks. I have made 182 ticks on his medical record card. If my arithmetic is correct, I have written Sam's full name and disabilities and my signature 91 times each and the figure 4 182 times. I am not prepared to work out the acreage of paper consumed, but it is nice to think that my laudable reiteration has at last carried conviction.

* * *

"I'll bring my bitch along this afternoon, if I may," said my shooting companion; "she's useful though she may be a bit wild." She proved to be a young golden Labrador of great beauty but obviously very pregnant and not at all wild. "She's a primigravida. How far on would you guess she is?" asked my friend. "Nearing full term I should imagine," said I, and the keeper hazarded the opinion that she wouldn't go much more'n a week. She hunted rather sedately, and, walking homeward, we noticed a bag of membranes presenting. She appeared to be in no distress but squalled at intervals whenever she had a good pain. We spread a sack on the back seat of the car, made her comfortable and went into the keeper's cottage for tea. Twenty minutes later we found she had had two pups, and a third was born as we drove home. All are doing well.

Public Health

Annual Reports

METROPOLITAN BOROUGHS

The population of the metropolitan boroughs has been shrinking for many years due in the main to emigration from the metropolis to the outer ring. This migration, mostly of young married people with their families, explains the apparent increase in insanity, especially of senile dementia, with which the county council has to deal. The borough which has suffered the severest depletion is *Shoreditch* which at the end of the last century had a population of 122,000. In 1938 the population was 80,000, but during the war this has shrunk to less than half. In the past, the borough was densely overcrowded both per acre and per hereditament. Infantile mortality which was close on 200 in 1899 sank steadily to 31 in 1939, but rose to 69 in 1940 and 63 in 1941. Tuberculosis notifications sank from 6·3 per 1000 population in the last war period to 1·2 in 1939 and the tuberculosis mortality from 3·0 in 1903–07 to 0·7 in 1938. There has been a brisk rise in the past two years. In 1941 notifications were 3·0 and mortality 2·2 per 1000 population, but in view of the disturbance of the population, this apparently alarming increase must not be taken too seriously.

In *Islington*, new cases of pulmonary tuberculosis in 1941 were 40% and of other tuberculosis 23% above the 1938 figures; while the mortality increased 67% and 55% respectively. Whilst there is no doubt that tuberculosis did increase in 1940 and still further in 1941, local returns must be read with caution. One obvious factor augmenting the local rates is the rejection from the services of recruits found to be tuberculous on call-up. These are returned to the civil population, so the tuberculosis-rate of young men in the civil population is very high indeed. So far as can be told at present there has been a substantial decline in tuberculosis in 1942.

In *Hammersmith*, increase in tuberculosis in 1941 was slight. Dr. J. B. Howell, in his report for that year, mentions that the old tuberculosis dispensary was destroyed and the work transferred to the British Postgraduate Medical School where "the work has been carried on under much better conditions, and in my opinion the Dispensary is now in the place where it always should have been, where the Tuberculosis Officer has the advantages of all the ancillary services." In Hammersmith the birth-rate in 1941 was 16·5, the highest since 1928, when it was 16·6.

In *Hackney*, on the other hand, the birth-rate dropped from 15·2 in 1940 to 13·7 in 1941. At the cleansing station 248 children under five were treated for scabies, 1058 children over five and 1618 adults; 120 people, all adults, were also cleansed of body lice.

THE OUTER RING

The townships of the outer ring show the other side of the picture. They are not self-contained populations but in large part dormitories for the metropolis. They vary greatly in the composition of their populations and still more in the powers possessed by their ruling authorities. On the whole, they have excess of young married couples in rather favourable circumstances who work in London but can afford to live outside the capital and travel to their work. Their health records should therefore be good and in general they are, though they show considerable variations. Their birth-rates are much lower than they should be to maintain their populations by natural increase. Taking four at random, the birth-rates in 1941 were 12·86, 11·65, 13·31 and 12·42. The corresponding death-rates were 13·95, 11·2, 13·46 and 12·65. Infantile mortality is also uneven, varying from 21·8 in Finchley to 63 in Hornsey. Maternal mortality was low in most, but not in all. In Wembley it was 4·30; in Hornsey 3·24; in Leyton it was 0.

Dr. A. G. Morison of *Wembley* (where 21 out of 95 infant deaths were certified as premature birth) says, with truth, that prematurity is now the greatest single factor in human mortality and the most promising line for the immediate reduction of infantile mortality is in adequate facilities for treating premature infants. In Chicago and New Zealand much success has been

achieved by treating immature infants as cases of deficiency disease, whilst at the same time research is progressing into the cause of prematurity.

Dr. Caryl Thomas of *Harrow* calls attention to the rise of paratyphoid which during the war has been spread mainly by artificial cream, though many stray cases occur in which the source of infection cannot be traced. The fatality of paratyphoid in the past three years has been extraordinarily low, largely due to better recognition of mild and abortive cases, but possibly also to the medium by which most cases are infected.

In *Leyton* in 1892 the birth-rate was 35 and infantile mortality 141. In 1941 the birth-rate was 13·31 and the infantile mortality 38·3. The highest infantile mortality in the half century was 155 in 1899, the year in which this rate soared to a high record in all parts of Britain. 1911 was the last year in which the rate in Leyton exceeded 100 (116·6) and 1926 the last in which it exceeded 60 (64·8).

In *Hendon* measles and whooping-cough were prevalent in 1941, the former causing 3 and the latter 6 deaths. Notifiable pneumonia was also exceptionally prevalent.

Infectious Disease in England and Wales

WEEK ENDED DEC. 12

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 1 (at Swinton, Yorks); scarlet fever, 2769; whooping-cough, 1326; diphtheria, 1079; paratyphoid, 7; typhoid, 10; measles (excluding rubella), 13,287; pneumonia (primary or influenzal), 989; puerperal pyrexia, 174; cerebrospinal fever, 75; poliomyelitis, 7; polio-encephalitis, 0; encephalitis lethargica, 3; dysentery, 133; ophthalmia neonatorum, 69. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on Dec. 2 was 1990, including scarlet fever, 677; diphtheria, 258; measles, 304; whooping-cough, 165; enteritis, 94; chicken-pox, 75; erysipelas, 37; mumps, 46; poliomyelitis, 2; dysentery, 44; cerebrospinal fever, 6; puerperal sepsis, 24; enteric fevers, 9; german measles, 1; encephalitis, 1.

Deaths.—In 126 great towns there were no deaths from scarlet fever, 2 (1) from enteric fevers, 14 (1) from measles, 5 (0) from whooping-cough, 21 (3) from diphtheria, 51 (5) from diarrhœa and enteritis under two years, and 42 (2) from influenza. The figures in parentheses are those for London itself.

The second fatal case of enteric fever was at Tynemouth. Liverpool and Rhondda each reported 5 deaths from influenza, no other great town more than 3.

The number of stillbirths notified during the week was 230 (corresponding to a rate of 38 per thousand total births), including 25 in London.

FIFTH SUPPLEMENT TO THE BPC

THE latest supplement to the BPC 1934 (London: Pharmaceutical Press, pp. 38, 2*s.* 6*d.*) contains a full cumulative index to the changes made in this and the four previous supplements. In part I monographs are added for prepared derris, with a new preparation, applicatio derridis BPC, and for lonchocarpus, both for the treatment of scabies. The other changes in the monographs and formulæ are in preparations of which quinine is not regarded as an essential constituent. Thus quinine is omitted from the formula and title of extractum malti liquidum cum quinina et strychnina, pilulæ ferri phosphatis cum quinina et strychnina, syrupus ferri bromidi cum quinina and cum quinina et strychnina, tabellæ ferri phosphatis cum quinina et strychnina. Quinine also disappears from glycerinum hypophosphitum compositum, pilulæ ferri valerianatis compositæ, pilulæ podophyllini et quininæ, syrupus hypophosphitum compositus, syrupus triplex, tabellæ hypophosphitum compositæ, tabellæ phosphatum et hypophosphitum compositæ, and tinctura antiperiodica. It will be news to many prescribers that all these preparations contained quinine. In part II the only changes are verbal ones to allow synthetic rubber to be used in making surgical sheetings and plasters.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

Letters to the Editor

CEREBROSPINAL FEVER, 1914-17

SIR,—A statement by the Minister of Health reported on p. 688 of the *Lancet* of Dec. 5, that in the outbreak of cerebrospinal fever of 1914–17 two out of three cases were fatal, needs qualification. The figures are given on p. 147 of vol. I, Medical Services, *Official History of the Great War*. They were as follows. Troops in the United Kingdom: cases 3549, deaths 1640, fatality 46·2%. Civilian population: cases 5306, deaths 3471, fatality 65·4%. Total: cases 8855, deaths 5111, fatailty 57·7%. The Minister's remarks therefore apply to the civilian population only, since the fatality among the troops, far from being two out of three, was less than one in two.

East Molesey. MERVYN GORDON.

YOUTH PROBLEMS AND MENTAL HEALTH

SIR,—Dr. Mayer-Gross raises matters of vital importance to the community. Referring to wanton destruction of property by youths, and irresponsible behaviour and spread of venereal disease by girls, he states that psychopathic, and morally and mentally defective, persons are largely responsible for these acts. He also suggests that such persons could be treated and the offences prevented if an adequate mental health service existed.

Fully staffed and well-equipped psychiatric and child-guidance clinics can assess the mental state of an offender, but relatively few of these cases are amenable to psychiatric treatment in an outpatient department. In many areas there is a lack of diagnostic facilities, but a more serious omission is the lack of suitable residential care and treatment to meet the needs of the individual case when the diagnosis has been made and the necessary measures decided on. The overlapping of the functions of the Board of Education, the Ministry of Health, the Home Office, the local authority and the voluntary organisation adds to the difficulty and reveals the urgent necessity for a Ministry of Childhood and Youth. A further aggravation of the problem already existing among the juvenile population is arising from the discharge from the Forces of men and women who, by reason of mental defect and psychopathic disability, are found to be unamenable to psychiatric treatment and unfit to serve.

Liverpool. MURIEL BARTON HALL.

INGUINAL HERNIA

SIR,—In reply to Brigadier Harold Edwards's interesting letter, my adoption of the Bassini operation has been gradual during the past eight years, performed at first reluctantly because it required a longer effort and greater attention to detail than the operation for hernia ordinarily practised in this country. The average English textbook does not detail Bassini's operation. His description, now 50 years ago, still compels my admiration. I have never seen a recurrent hernia after it, and this after a faithful follow-up which includes patients who have recurred once, twice, and in one instance three times previously. There are certain operations which I have found difficulty in accepting, but which experience has proved to meet patients' needs. They include subtotal thyroidectomy for the toxic thyroid, subtotal gastrectomy for a peptic ulcer, the muscle-cutting incision for exposure of the kidney, and the precise operation of Bassini for the cure of inguinal hernia, which admittedly distorts the anatomy a little, but in my hands has consistently cured.

I fully agree that the time in bed after operation is important. In my practice it is 16 days for the fit young adult with the indirect hernia, 18 days for double indirect and for unilateral direct hernia, and 3 weeks for the double direct hernia. Recent work on the time required for union of tendons confirms that these periods are right and in no way too long. I believe that some recurrences can be explained by the resumption of too early function.

Another point which may be important in the avoidance of recurrence is fitting every patient after

herniorrhaphy with a Curtis No. 1 abdominal belt; not a truss. It is worn for three to six months. The rationale is to prevent the "pot-belly" sag of the lower abdomen which often occurs after operation, associated with an aching discomfort and sometimes a "bearing-down" pain. With the stretching of the lower abdomen comes the corresponding expansion of the internal and external rings. The belt prevents this. It may not be possible to fit soldiers with belts; probably the exercises described by Brigadier Edwards to restore the tone of the lower abdominal muscles—in other words, abdominal rehabilitation—will achieve it more effectively, but I should be reluctant to start it before three weeks.

Harley Street, W.1. HAROLD DODD.

PROTECTION AGAINST BEE-STINGS

SIR,—In an article on bee venom in 1933 (*Lancet*, ii, 446) I called attention to the fact that about 2% of all people are seriously upset by bee-stings, and in a much smaller percentage death occurs. The only remedy after the sting is adrenaline hypodermically if in time, and since the average time between sting and death is about 12 minutes this time is short. It is therefore necessary to find a preventive. I had recently been attending a woman with massive urticaria—a common manifestation of bee-venom poisoning—and found calcium so effective and speedy in action that I decided to try it in prospective bee-keepers. For three weeks before attempting to handle bees the person takes one 'Ostocalcium' tablet (Glaxo) 3 times a day, and thereafter one tablet a day until the bees have gone to bed for the winter. It is well on the first occasion for handling bees to have a doctor present with syringe and adrenaline, and deliberately to incite a bee to sting. So far I have seen no general reaction from the venom in 8 keepers so protected, but time will show whether this is more than chance.

Nottingham. FRANCIS THOMPSON.

Obituary

IVOR LLOYD TUCKETT

M D CAMB

Ivor Lloyd Tuckett, who died in the Isle of Wight from enteric fever on Nov. 28, came of Quaker stock, his father from Frenchay, his mother from Falmouth *née* Fox. Born in London in 1873, he was educated at Marlborough and at Trinity College, Cambridge, where he took a double first and headed the list in the natural sciences tripos. On completing his clinical training at University College Hospital, London, he qualified in 1898, and in the examination for the MB Camb. he was 300 marks ahead of the next candidate and was congratulated by Rose Bradford, who said it was an honour to examine him. After serving as house-physician at UCH he returned to Cambridge, where he had been made a fellow of Trinity at the age of 21, a record at that time. As an undergraduate he had worked at physiological laboratories in Germany, and he now settled down to several fruitful years of research on the functions of the pancreas in relation to diabetes, and the degeneration of nerve-fibres. This brilliant pioneer work, published in the *Journal of Physiology*, led to his appointment as assistant Downing professor of physiology, but a promising career was interrupted in 1906 by a breakdown in health. Forced to abandon research Tuckett spent the next three or four years travelling, mostly in New Zealand. On his return to England he retired to Hertfordshire and occupied himself with country pursuits, taking several prizes as a rose-grower. Soon after the outbreak of the last war he became anxious to use his medical knowledge, and at the suggestion of his friend Percy Flemming he offered his services to Moorfields, which owing to the call-up of younger men was in need of help, and after gaining experience he acted as house-surgeon there during the war years. On leaving Moorfields he served for a time as house-surgeon at the Norfolk and Norwich hospital, and in 1923 he settled in the Isle of Wight where he lived until his death, carrying on an ophthalmic practice at Cowes and Newport. In later years he was elected a fellow of University College.

Ivor Tuckett was a man of wide interests, an omnivorous reader with sound critical faculty, an expert debater and keen conversationalist. His boyish zest for life, sprightly sense of humour and unusual physical activity remained with him until his last illness. Nature in all her aspects and the mysteries of the human mind were of absorbing interest to him, and he made an intensive study of psychology and was himself psychoanalysed. His favourite hobby was yacht racing, and of late years he kept a small yacht in the Solent. Tuckett's passionate love of truth and hatred of shams and superstitions led him to examine the claims of spiritualists and mediums, the outcome of which was *The Evidence for the Supernatural* (1911) which has since been issued in a popular edition. He became a member of the Rationalist Press Association, for whom he delivered the Moncure Conway lecture in 1920 on *Mysticism and the Way Out*. He was always thinking of others and helping those in difficulties, financial or otherwise, and his friends will remember thoughtful acts of kindness without number.

He married Miss Anna Wikman, of Lund in Sweden, and they had one son, Major Cedric Tuckett, FRCS, RAMC.

R. A. G.

GLADYS JULIA CUTHBERTSON RUSSELL

M B ST. AND., D P H

Dr. Gladys Russell, who died on Dec. 7, was an able doctor, a wise administrator, whose service to maternity and child welfare was single-eyed and disinterested. She was born in St. Cyrus, a village on the East coast of Angus where her father was schoolmaster, and educated at Montrose Academy and at St. Andrews University where she graduated in 1919. After holding house-appointments at Dundee Royal Infirmary she became resident medical officer at the Lonsdale Hospital, Barrow-in-Furness, and later at the Children's Hospital, Pendlebury, where her interest in children was awakened. She therefore took the DPH at Manchester in 1924, and joined the staff of the Cheshire county council as assistant medical officer for maternity and child welfare. Two and a half years later she moved to a similar post in Monmouthshire and in 1928 she went to Leeds where her promotion was rapid. Soon after her appointment the post of senior medical officer in the maternity and child welfare department fell vacant and she was chosen to fill it.

During her tenure of office there have been great changes. The department has expanded in many directions and with each expansion her responsibilities were increased. Among the greatest and most important of these developments were the proposals which formed the basis of the reorganisation of the midwifery service after the passing of the Midwives Act 1936 which were largely the product of her brain and they have stood the test of practical experience.

Dr. Russell was the first woman to hold the office of president in the Yorkshire branch of the Society of MOHs and she was also a prominent member of the Medical Women's Federation, while her interest in the education and training of health visitors made her a valuable member of the examining board of the Royal Sanitary Institute.

JOHN PERCIVAL BROWN

M B MANC

Dr. J. P. Brown, who died on Nov. 30, was born at Bacup in 1878, and he and his father, the late Dr. John Brown, between them held the position of medical officer of health of that town for fifty-four years. John Percival was educated at Manchester Grammar School, and Victoria University, Manchester, where he qualified in 1900. After holding resident appointments in Manchester and Macclesfield, he joined his father in general practice, and the rest of his life was spent in the service of Bacup until owing to failing health he retired a year ago. Dr. Brown was a corps surgeon in the St. John Ambulance Brigade, and in 1926 he was appointed an officer of the Order of St. John. During the last war he did valuable Red Cross work. Keenly interested in historical medicine and legal medicine, he rarely missed a meeting of the Manchester Medico-Legal Society. He leaves his wife with two daughters and a son, Surgeon Lieutenant Douglas Brown, RN.

Parliament

Compulsory Treatment of VD

ON Dec. 15 Dr. EDITH SUMMERSKILL carried with her into the "ayes" lobby 30 other members, including Dr. Morgan, in support of her prayer for the annulment of regulation 33B. The "noes" numbered 245 and included 9 medical members. Dr. Summerskill said the Minister of Health was toying with the problem and delaying real action. Last year there were 70,000 admitted new cases of venereal disease, and probably as many more untreated or untraced. We had gone back to the situation of 1932 and would soon be back at 1928 when 16,000 expectant mothers were found to be infected. Let us have more clinics, and for women clinics where all their complaints are treated, let us follow up contacts, but if a patient ceases attendance let an order be served on him. She quoted Major S. M. Laird as having said that as a result of compulsory notification in Sweden the defaulter rate in 1935 was only 2·5%, while in this country (without compulsory notification) it was 82·5%. But Mr. Brown later called the comparison fallacious because the English figure was obtained just by subtracting from 100 the percentage of cases stated to have completed their cure in that year. The regulation as framed might, she said, cause hardship and injustice to some unfortunate woman, but it would be ineffective and she called on the house to be bold, frank and courageous.—Mrs. HARDIE, in seconding the motion, agreed that the regulation would be useless and dangerous. All she wanted was an extension of confidential medical treatment, combined with a great educational effort.

Sir FRANCIS FREMANTLE thought we were all agreed that venereal disease should be treated like other diseases and equally agreed about moral and educational measures, had these been under discussion. But he blamed the house for being unwilling to look disgusting facts in the face and failing to sense an immediate peril. He recounted the change of medical and scientific opinion from regulation of prostitution to the provision of free and secret treatment; he recalled the rejection of the Edinburgh Corporation Bill 1928 for fear it would impair the voluntary system. But what, he said, is the good of pretending to set up clinics when you have not the doctors to man them? Notification without treatment is a waste of time and this regulation brought in, like other public health measures, in a small way should be tried out to see how far it is efficient.—Dr. HADEN GUEST warmly endorsed this view and spoke of the definite problem of saving men and women, in the Services and shortly to be called up, living in conditions favourable to a grave spread of venereal disease. The press had done admirable work in publicity during recent months, leading up to the frank and free broadcast discussion. But what was the value of notification, or even treatment, if not directed to the source of infection? To set up in this country clinics on the Swedish standard would mean multiplying them by ten or more. Nor had compulsory notification prevented the rise of venereal disease in the Services.—Sir ERNEST GRAHAM-LITTLE said that science should regard the present situation as an epidemic which could not be stopped by ordinary safeguards. He was not himself fond of notification: he thought it destroyed to a large extent the privacy which ought to attend medical treatment. The Minister might later find it necessary to extend his powers to include notification; meanwhile, let us take this regulation as an instalment.—Capt. G. S. ELLISTON agreed with Mr. Graham White that no government dare resist the responsibility of enforcing some regulation of this kind; we could do no other than apply public health measures to secure treatment for the small group of cases which played a big part in spreading infection.—Dr. H. B. MORGAN opposed compulsion in any form, whether in notification or treatment. "I have never yet known a case," he said, "when the situation was properly explained in strict confidence, that would not accept treatment." If the Minister did not know how to work the voluntary method, let him ask psychologists.

THE MINISTER'S REPLY

Mr. ERNEST BROWN registered agreement that venereal diseases are an evil which must be stamped out if possible, that their spread hampers the war effort, and that moral and ethical issues lie behind the question. Promiscuity could not be made safe and the MRC had refused the task of recommending a prophylactic. We ought to do our utmost to extend and improve the spread of accurate knowledge and steps had been taken to coördinate education in this subject with all other health subjects by the Central Council for Health Education. The press had been most helpful and a bold, constructive and sane discussion on a healthy plane should help the religious forces in this country to make their own case clear. Is special action needed now? The debate made it clear that there was overwhelming opinion for such action; perhaps the dissentient feeling outside was larger in bulk than in the house. No minister would raise the issue unless there were grave cause for doing so. In prewar days the voluntary system was not failing, although more might have been done. His aim was to strengthen that effort, not to break it. Regulation 33B was only part of the answer to the problem. The three main essentials were public education, adequate free treatment and indirect action to discourage promiscuity. But he claimed for the regulation that it represented a new approach to the problem—a public health approach. It did not attempt, as did 40D of the last war, to control solicitation and it did not discriminate between the sexes. Medical officers had always done their best to find out where the disease was contracted. (To use the word "informer" for them was described as somewhat far fetched by 7 medical women in charge of VD clinics in a letter to the *Daily Telegraph* of Dec. 15.) It was their public duty. Regulation 33B gave the doctor the power, or rather the duty, to pass the information on, but not to anybody in public. When notification is made every attempt will also be made to get the person to come voluntarily. The appearance of the regulation had already caused some who had not volunteered for treatment to come forward. Asked by Dr. RUSSELL THOMAS what remedy there was for an innocent party against whom information had been given, Mr. BROWN replied: My hon. friend has got it completely wrong. All that they are asked to do is to come for examination in complete secrecy. There is no public discussion. If the MOH on the local authority has reason to believe there has been malice, very heavy penalties are provided.

QUESTION TIME

Edinburgh Smallpox Outbreak

Mr. A. EDWARDS asked the Secretary of State for Scotland whether he would give the dates of the development of the smallpox rash or chickenpox rash in any cases mistakenly believed to be chickenpox, in the cases diagnosed as smallpox during the recent outbreak at Edinburgh; and the dates of their removal to hospital?—Mr. T. JOHNSTON replied: The only smallpox case in the Edinburgh outbreak which was originally diagnosed as chickenpox was the first case discovered in the Royal Infirmary. The rash appeared on Oct. 27, and the patient was removed to the City Fever Hospital next day.—Mr. EDWARDS: How many of the four fatal cases of smallpox in Edinburgh and district had been patients in a medical institution or an associated convalescent home before they contracted smallpox?—Mr. JOHNSTON: There have been six deaths from smallpox since the present outbreak started in Edinburgh. The first four of these had been patients in a medical institution or associated convalescent home in Edinburgh on the probable date of infection. The two other patients had no connexion with the institution or home.—Mr. A. EDWARDS: Was the first case of smallpox at Edinburgh taken to the Royal Infirmary suffering from some other illness and did the supposed chickenpox attack develop afterwards, or was the patient taken to the Royal Infirmary as a case of chickenpox?—Mr. JOHNSTON: The first case of smallpox in Edinburgh was in the Royal Infirmary for another illness when an illness developed which was at first thought to be chickenpox. As infectious disease is not treated in the Royal Infirmary, he was removed to the City Fever Hospital, where after examination he was diagnosed as a case of smallpox.

Planning for TB Control

Mr. JAMES GRIFFITHS asked the Minister of Health what progress has been made in carrying out the steps to combat tuberculosis recently announced; and what arrangements have been made in regard to the provision of financial assist-

ance to dependants ?—Miss F. HORSBRUGH: Deliveries of the equipment to which the Minister referred in his statement on Oct. 8 have not yet begun. In the meantime progress has been made with the detailed arrangements for its use as soon as it comes to hand, and the Minister hopes to issue in the next few days a circular to local authorities regarding the development of the tuberculosis service in all its aspects including particulars of the allocation of the miniature radiographical sets. Arrangements have been made to make additional beds available for tuberculosis and as regards the supply of nurses for this and other forms of work, the Minister of Labour and National Service and the Minister of Health are discussing detailed plans with the organisations concerned. The administrative arrangements for the financial assistance to which the Minister referred in his statement and on which he is consulting with interested organisations are nearly complete and he hopes it will be possible to give the necessary guidance to local authorities in the near future.

Equipment for Lifeboats

In replying to a question the Parliamentary Secretary to the Board of Trade described the equipment which the Ministry of War Transport requires shipowners to provide in lifeboats. It includes a minimum supply of approximately 3 quarts of water per person. This is about treble the prewar requirement, and more must be provided as far as is practicable Sun protection is afforded by canvas hoods and weather-cloths fitted in the boats and by protective suits which are supplied to all members of the crews. An approved first-aid kit, recently reviewed with expert medical advice, must also be provided, and also one gallon of fish, animal or vegetable oil or other approved substance for massage. The emergency rations per person are as follows:

112 oz. of fresh water	14 oz. biscuits
14 oz. chocolate	14 oz. milk tablets

14 oz. pemmican (or other approved meat extract).

KING EDWARD'S HOSPITAL FUND FOR LONDON

AT a meeting of the fund on Dec. 15, the Duke of Gloucester, the new president, announced that this year £28,000 is to be distributed to hospitals. This is rather less than in recent years but the distribution committee have taken into account the probability that there will be heavy demands on the fund after the war. They have also set aside £5000 for grants to hospitals for the establishment of preliminary training schools for nurses. The committee hope that these grants will encourage the smaller hospitals to set up schools, perhaps as joint enterprises.

The Minister of Health in moving a vote of thanks to the president said that the moment was notable, for the Beveridge report had made a provocative contribution to the reconstruction theme. One feature of particular interest both to him and to the fund was its assumption that comprehensive health and rehabilitation services will ensure medical treatment for everyone. This, as he had announced in the House in October, 1941, was indeed the Government's intention and it was part of the Government's policy to maintain the principle that patients should make a reasonable payment towards the cost of treatment. "The Beveridge report," Mr. Brown continued, "recognises that the question of patients' contributions and of contributory schemes is one which can be decided only in relation to the whole problem of the organisation of hospital services, and one which will depend on the general policy found best for providing those services. While it is too early yet for me to determine the shape of that policy (I am now conducting all the preliminary spade-work and shall later be consulting the interests most concerned) no-one can be more alive than I to the value of the practical work done in the past, and being done now, by the various contributory schemes: and also to their potentialities for the future—particularly if they are able to converge a little more on to more uniform paths, for example in their rates of payment to hospitals and in their readiness to extend those payments equally to any hospital, wherever situated, to which the medical needs of a patient make it desirable to send him. You have, I know, been putting a good deal of useful effort into the questions of contributory schemes in London and the better correlation of their activities. You would, I feel, be well advised to go ahead with this—perhaps particularly on the two aspects which I have just instanced—and your progress will certainly be of interest to us, in considering the part which it may be found best to expect these schemes to play in any long-term hospital policy."

A CONTRIBUTION TO THE MYTHOLOGY OF CANCER RESEARCH

E. L. KENNAWAY, MD, FRS

Thomas Henry Huxley, in a well-known essay, gave a destructive estimate of *The Value of Witness to the Miraculous* (why can no-one write now as he did, either in spirit or in style ?). But scientific workers often have reason to doubt the value of witness to the non-miraculous also.

ARSENIC CANCER IN HORSES

The literature of cancer research contains frequent references to an alleged piece of evidence for the carcinogenic action of arsenic recorded by Dr. J. A. Paris, MD, FRS, late senior physician to the Westminster Hospital, in his book bearing the title, lengthy as was usual in those days, of

PHARMACOLOGIA; comprehending the Art of Prescribing upon Fixed and Scientific Principles together with the History of Medicinal Substances

which reached its 3rd edition in 1820 and its 5th edition in 1822. Dr. Paris says: "The poisonous effects of arsenious acid are so amply detailed in medical works, that it would be superfluous to dwell upon them in this place; it may however be interesting and useful to record an account of the pernicious influence of arsenical fumes upon organized beings, as I have been enabled to ascertain in the copper smelting works of Cornwall and Wales. This influence is very apparent in the condition both of the animals and vegetables in the vicinity; horses and cows commonly lose their hoofs, and the latter are often to be seen in the neighbouring pastures crawling on their knees and not unfrequently suffering from a cancerous affection in their rumps, whilst the milch cows, in addition to these miseries, are soon deprived of their milk; the men employed in the works are more healthy than we could *a priori* have supposed possible; the antidote upon which they all rely with confidence, whenever they are infested with more than an ordinary portion of arsenical vapour, is *sweet* oil, and an annual sum is allowed by the proprietors in order that it may be constantly supplied; this opinion is not solitary, for Tachenius relates that the poisonous effects, such as convulsions, gripes, and bloody stools, with which he was seized from exposure to the fumes of arsenic, were relieved by milk and oil."

Dr. Paris does not say how he obtained this information, but the *Dictionary of National Biography* tells us that he practised medicine in Penzance from 1813 to 1817, so he had opportunity to collect such data in Cornwall. However, the statement quoted was obviously of little or no value as evidence even at the time of publication, for several reasons. (1) There is nothing to show the cancerous nature of the alleged tumours; one does not of course blame Dr. Paris for this, for the microscopic diagnosis of malignancy had not then been begun. (2) We are told nothing about the incidence upon the cow-population-at-risk. (3) Dr. Paris does not tell us, as a modern investigator would be expected to do, whether the curious incidence of these affections upon hoofs and rumps was the same in Cornwall, and in Wales; moreover, in his fifth edition, published only two years later, he omits all reference to Wales without any comment on this change. (4) No attempt is made to show that arsenic, among the various emanations from the industry, was the active substance. And surely, if no better evidence than this has come from the locality in question during more than a century, the writers on cancer who have quoted and requoted it over and over again during this period should have come to regard it as still more suspect.

Dr. Paris goes on to say: "It deserves notice that the smelters are occasionally affected with a cancerous disease in the scrotum, similar to that which infests chimney-sweepers, and it is singular that Stahl in describing the putrescent tendency in the bodies of those who die from this poison, mentions in particular the gangrenous appearance of these parts."

Seventy years after the appearance of the 5th edition of Dr. Paris's book, Henry Butlin, surgeon to St. Bartholomew's Hospital, who had a very different standard of accuracy, investigated this matter. To Butlin, no

trouble was too great if he could learn anything about the cause of "chimney-sweeps' cancer"; his laborious travels and inquiries are described in three lectures *On Cancer of the Scrotum in Chimney Sweeps and Others*, delivered before the Royal College of Surgeons of England in 1892, which are well worth reading or re-reading (*Brit. med. J.* 1892, i, 1341; ii, 1, 66). Butlin went to Cornwall to see what he could learn of the phenomena described by Dr. Paris, and in his third lecture gives the following account of his inquiries.

"This remark of Paris has been referred to or quoted by several authors, both English and foreign, but I have failed to find the smallest evidence on which it can rest. As Dr. Paris spoke especially of the smelting works and burning houses of Cornwall, I made careful inquiries of the doctors at Camborne and Hayle. In the neighbourhood of Camborne there are several tin-burning houses, the tall chimneys of which puff forth a white smoke. The surrounding fields are very poor in vegetation and there are but few cattle in them. The atmosphere is said to be unhealthy to animals and men, rather from sulphurous acid than from arsenic. I was told that not long since an action had been brought by a gentleman in the neighbourhood to restrain the tin-burners from continuing to burn tin there. The plaintiff declared that he had lost a horse owing to the unhealthy fumes, but he lost his action also. Mr. Pike, a gentleman largely engaged in the mines, told me that there is but little arsenic now compared with what there was a few years ago. Neither Dr. Hutchinson, who had been more than thirty years in practice in Camborne, nor my brother, who has been practising there for more than twenty years, nor Dr. Erskine, with ten years' experience of the diseases of the people, ever remembered to have met with a case of cancer of the scrotum in the whole course of their experience.

Hearing that tin smelting is carried on at Hayle, I drove there, and called on Dr. Mudge, who has been for very many years in practice, and, with his sons, attends a very large area around Hayle, and is familiar with the diseases of the work-people of all descriptions. He said that the smelting of tin is not now carried on to the same extent as formerly in that neighbourhood. Dr. Mudge remembered to have seen in past times eruptions and even rawness of the scrotum and insides of the thighs of the men exposed to the fumes of arsenic, but he had never seen a case of cancer of the scrotum, although he had seen several cases of cancer of the penis. Speaking of the effect of the arsenical fumes on animal life, he had never seen the loss of the hoofs of horses and cows described by Dr. Paris. On more than one occasion of late years the death of a cow had been attributed to the fumes of arsenic, and attempts had been made to obtain damages from the smelters. The viscera of some of these animals had been sent to Dr. Herepath, of Bristol, who had quite failed to discover arsenic in them. He further told me that the skin affections of the scrotum were healed by very simple measures when the men washed themselves, which they very often neglected to do when they were in good health."

These statements by Paris have been quoted over and over again by writers on cancer, but I do not remember ever to have seen in this literature any reference to Butlin's criticism.

The character of the information contained in Dr. Paris's book, which is still offered to cancer research workers as authoritative, may be illustrated by a few items taken at random from the index.

Acetification of milk by a thunder storm bears some analogy to the operation of depraved digestion .. 102
Ale, the supposed lithonthryptic properties of 212
Enemata, Clysters, calculated to fulfil five great indications 315
Prescott, Miss, persons of the first respectability became the dupe of 20
Tea and turtle soup, whether their admixture in the stomach may not form leather 314
Turner, Mr., why he escaped from the dose of arsenic administered to him in yeast dumplings 333

and so on.

The writing of this note was suggested by the fact that the 120th anniversary of the publication of Dr. Paris's 5th edition in 1822, and the 50th anniversary of Butlin's lectures in 1892, has just been marked by the inevitable reappearance, this time in a large monograph, *Occupational Tumors and Allied Diseases*, by W. C. Hueper (Springfield, Illinois, 1942), of the story of the cows' rumps, which is once again offered as serious evidence of the carcinogenic action of arsenic. The reference is given wrongly in the book in question as "Paris, J. A., Pharmacology, 3rd ed. W. Philipps, London, 1822"; actually the title of the book is *Pharmacologia*, the year of issue of the 3rd edition is 1820, and the publisher is W. Phillips. Hence the reader is offered an inaccurate reference to a statement of little or no value in an obsolete book.

After quoting once more the often-quoted passage about the cows' rumps and cancer of the scrotum, Dr. Hueper (*loc. cit.*, pp. 36 and 41) makes the following comments: "... Paris noticed the high incidence of cutaneous malignancy among the men employed in these factories." This is a somewhat highly coloured and extended version of Paris's simple statement that "the smelters are occasionally affected with a cancerous disease in the scrotum..." Dr. Hueper proceeds "... Paris mentioned the development of cancerous ulcers in domestic animals (horses and cows) grazing in meadows situated close to the copper smelters and tin-burning establishments. The arsenical fumes released from these plants into the atmosphere were precipitated upon the vegetation of the adjacent countryside. The arsenic contaminating the grass of the meadows was ingested by grazing animals and thus caused the development of the cancerous lesions." This picturesque addition about the grass of the meadows and the grazing animals adds nothing whatever to the very questionable value of Dr. Paris's story; it is not what Paris says, and he makes no claim that the arsenic was taken in by the mouth; it is surely quite possible that in such a neighbourhood arsenic might act upon the skin directly from outside. Lastly, Dr. Hueper, like most of the many writers who have quoted from Paris, lays down that cancer occurred in horses, whereas Paris makes no such statement. We may now await the next appearance of the story in the literature of cancer, and may reflect upon the phenomenon described, I think by Wilfred Trotter, as "the mysterious viability of the false."

CARCINOMA OF THE NASAL MUCOUS MEMBRANE IN SHEEP

Nieberle [1] describes the occurrence of carcinoma of the nasal mucous membrane occurring in a single highly inbred flock of Hampshire sheep on the Limbach estate in Saxony. Cases of this disease had appeared during several years and ten cases occurred during the course of a few months. The author describes these tumours as "carcinoma of the ethmoid bone which corresponded in essential character to the normal histological structure of the olfactory mucous membrane," and he gives two naked-eye figures of tumour masses in the nasal cavity, and a microphoto showing obvious carcinoma. With regard to ætiology, the author makes the interesting suggestion that the occurrence of this tumour in a single strain of sheep is comparable to the incidence of mammary cancer in certain strains of mice, but he considers also the possibility that arsenic might be concerned, as follows:

"Zum anderen ist aber zu beachten, daß das Rittergut Limbach in der weiteren Umgebung der Freiberger Hüttenwerke liegt und daß Schäden durch arsenhaltigen Flugstaub unter den Rindern der dortigen Gegend nicht selten sind. Allerdings handelt es sich bei diesen Arsenschäden, soweit ich sie bisher untersuchen konnte, stets um akute, mit Geschwürsbildung im Verdauungsapparat einhergehende Veränderungen."

which may be translated:

"One must take into consideration also that the Limbach manor lies in the remoter neighbourhood of the Freiberg smelting works, and that lesions due to arsenical fumes are not uncommon among the horned cattle of that district. But these arsenical lesions, as far as I have hitherto been able to investigate, always consist in acute changes, with ulceration, in the digestive tract."

Estimations of arsenic in organs of sheep bearing nasal tumours, carried out in the Institut für Gerichtliche Medizin in Leipzig, are reported. "Portions of the brain were first examined. These have extremely minimal amounts of arsenic, and contain actually *less than* 0·1 mg./kg. brain substance." In the tumours "only extremely minute amounts, again *less than*

1. Nieberle, K. *Z. Krebsforsch.* 1939–40, **49**, 137.

0·1 mg./kg., could be detected." In liver " an amount of 0·1 mg./kg. was found, that is, relatively considerably more than in the brain and tumour."

From his clear and concise account of the available data Nieberle draws the following cautious conclusion. " Hence the pathogenesis of the endemic ethmoid cancer in the stock of sheep on the Limbach estate is obviously not yet explained. However, I think that a certain connection of the disease with the locality and with it an injury by arsenic can scarcely be excluded." In Hueper's textbook (p. 41; see also p. 408), Nieberle's description, and very guarded conclusions, undergo the following transformation.

" Recently, Nieberle reported the endemic occurrence of adenocarcinoma of the nasal sinuses in a flock of sheep kept in the fume and dust zone of these smelters in Freiberg. He suggested that this condition was caused by the chronic introduction of arsenic, as not only was arsenic found in the brain, tumour tissue and liver of the affected animals, but attacks of acute arsenic poisoning with gastrointestinal manifestations were not uncommon among the sheep which furnished the cancerous animals."

This version of Nieberle's paper is either wholly misleading, or false, in every single particular. (1) His non-committal phrase " in the remoter neighbourhood of the Freiberg smelting works," appears as " sheep kept in the fume and dust zone of these smelters in Freiberg." [2] (2) Nieberle's inability to exclude arsenic becomes a direct suggestion that arsenic is the cause of the tumours. (3) The emphasis laid by the medicolegal analyst upon the minuteness of the amounts of arsenic in the brain and tumours is ignored. (4) The last statement is simply false. There is no mention whatever in the paper of any " attacks of acute arsenic poisoning with gastro-intestinal manifestations " in " the sheep which furnished the cancerous animals " at Limbach; these attacks occurred in the horned cattle in the vicinity of Freiberg (" unter den Rindern der dortigen Gegend "; see passage quoted in full above). The whole import of Nieberle's statement is to contrast the acute intestinal lesions due to arsenic in the horned cattle around Freiberg with the slow neoplastic changes in the sheep at Limbach, and this contrast is simply ignored, and the whole sense of the passage reversed, in the quotation given above from the textbook.

ARSENIC CANCER IN DEER

Prell [3] investigated a disease affecting the wild mammals (red deer, roe deer, hares, foxes) of the Tharandter Wald lying to the east of the mines of Halsbrücke and Muldenhütten in Saxony, and characterised by loss of hair, blackening of the skin, thickening of the stratum corneum and extreme emaciation. As many as 60–70% of the red deer were affected. " Often horny warts were scattered abundantly over the skin, or it was covered with horny desquamation (Manchmal war die Haut reichlich mit Hornwarzen besetzt oder mit Hornabschilferungen überzogen)." The context indicates that these warts were found in red deer, though the species is not stated explicitly; the skin of the roe deer was in almost every way less affected. These warts are the sole neoplastic structures recorded by Prell in his report of the examination of 41 red deer, 102 roe deer and 27 hares. In this paper of 14 pages cancer is mentioned once only (p. 661) in a sentence which refers to our general knowledge of the action of arsenic. Several hundred estimations of arsenic in the organs of these animals were made. " These ranged from a few mmg./kg. to 42 mg./kg. in the liver and to 12 mg./kg. in the hair." (Cf. analyses on Limbach sheep above.) Arsenic was often absent in the organs of animals showing the lesions described above, but was never present in those not showing such lesions.

Prell is a zoologist and makes no claim to knowledge of pathology. A part of the pathological work was undertaken by Professor Hofmann of the Hygienisches Institut der Technischen Hochschule in Dresden, who contributes a short paper, *Die Gefährdung der Tierwelt durch Industriegase* (to which curiously enough Hueper makes no reference either in the text or in the bibliography) following immediately that of Prell (*loc. cit.*, p. 670). Hofmann devotes five words to the single cancer, in a roe deer, which was discovered in the whole course of this investigation—" Weiterhin sahen wir aktinomykotische Auflagerungen auf der Pleura eines Hasen und ein Hautcarcinom bei einem Reh." Hueper gives the following account of Prell's results.

" Prell reported in 1936 the occurrence of extensive arsenical injuries among the domestic and wild animal life in the region of Freiberg, Saxony, where numerous smelters (silver and lead) released arsenic containing fumes into the air. It was shown that these arsenical fumes were spread over an area measuring 50 km. in diameter and settled upon the vegetation. Horses, cows, goats, and pigs, feeding on this vegetable matter, developed loss of hair and hyperkeratoses, while melanotic spots and precancerous warts were seen occasionally on the skin of deer inhabiting the forests of this region. A carcinomatous lesion was found in one deer. In addition to the cutaneous manifestations of chronic arsenic poisoning domestic, as well as wild animals, were affected by arsenical enteritis, gastric ulcers and cirrhosis of the liver. There existed in this area an extraordinary mortality among insects, especially bees."

When one compares Hueper's version with the original, one finds that Prell makes no mention whatever of any hyperkeratoses in horses, cows, goats or pigs, nor of any " extraordinary mortality among insects " other than bees, apart from a bare statement of a mortality among silkworms. Hueper chooses to describe the warts in deer as " precancerous." Possibly they were precancerous, but Prell does not say so. A transcriber has no right to colour the evidence of a first-hand observer by the insertion of such a word. There is the less justification for this addition in that these " precancerous " warts occurred chiefly or solely in red deer, in which not a single cancer was found.

[Anyone who reads the actual papers of Prell and Hofmann must surely be struck by one view of the matter which is the reverse of that advocated by Hueper. Hofmann emphasises the importance of analyses of arsenic in the tissues because the evidence of morbid anatomy alone cannot prove that any given lesion is due to arsenic, and points out that it was by means of estimations of arsenic " that the so called Hüttenrauchkrankheit (smelting-fume disease) of horned cattle in the district of the Freiberg smelting works, which had been known for many decades, was recognised as chronic poisoning by arsenic. The clinical phenomena, such as chronic diarrhœa, cough, sclerodermia, chronic squamous eczema, muscular atrophy, paralytic weakness, emaciation, &c., give no more proof of chronic arsenic poisoning in the cattle than do the post-mortem findings, which consist chiefly in the presence of old ulcers and scars in the abomasum and small intestine. It was the demonstration of arsenic in the organs of the diseased cattle which brought the clear recognition that the so-called smelting-fume disease was a chronic arsenic poisoning." This extensive list of widespread pathological changes, observed in numbers of cattle over a long period,[4] contains no reference to the detached hoofs and cancerous rumps of the Paris tradition, nor to cancer of the nasal mucous membrane such as occurs in the Limbach sheep (see above), nor indeed to cancer in any form. This absence of malignant growths in cattle, and the yield of one single cancer from the examination of 143 deer and 27 hares exposed to arsenic, surely amounts to evidence against, rather than for, the carcinogenic action of arsenic in these animals, of whom presumably a few at any rate live long enough for the development of malignant growth.]

SUMMARY

Elsewhere,[5] Hueper summarises the matter thus: " . . . arsenic cancer has a relatively long latent period,

2. One has no means of knowing the exact distance of the estate where the sheep are kept from the smelting works. Stieler's *Hand Atlas* shows, unfortunately, two places called Limbach, one 44 km. and one 19 km. from Freiberg, and respectively 45 and 14 km. from Halsbrücke, one of the two sites of the smelting works named by Prell. The other, Muldenhütten, does not appear on the map. Prell (*loc. cit.*, p. 669) says " The effective range of suspended arsenic is much greater than is usually supposed (it extends under some circumstances to a distance of 20 km. or more)."
3. Prell, H. *Arch. Gewerbepath. Gewerbehyg.* 1936–37, **7**, 656.
4. Prell (*loc. cit.*, p. 667) says that a good description of the " smelting-fume disease " was given in 1878 by Haubner, Director of the Royal Veterinary School in Dresden.
5. *Cancer Res.* 1942. **2**, 559. The references 5–7 are to Nieberle, Paris, and Prell.

usually surpassing that of the average life span of the species used in such experiments. This contention is supported by the observation that animals with a much longer life span (horses, sheep, deer) have developed an environmental type of arsenic carcinoma of the skin or of the nasal mucous membranes (5–7)."

What is the evidence for this generalisation concerning "an environmental type of arsenic cancer" in horses, sheep and deer?

(1) *Horses.*—Dr. Paris does not claim any cancers in his hoofless horses, and even such slightly neoplastic structures as hyperkeratoses are not recorded in horses by Prell. What evidence is there in the literature that cancer has ever been produced in horses by arsenic? (For some reason, Hueper omits altogether from his list cows, the species in which Paris claims cancerous growths.)

(2) *Sheep.*—There are no definite grounds for the argument that the nasal cancer of the Limbach sheep is due to arsenic.

(3) *Deer.*—This use of the plural is not justified by the single carcinoma of the skin found by Prell and Hofmann in 102 roe deer and 41 red deer. This solitary tumour may possibly have been "an environmental type of arsenic carcinoma," but one must bear in mind that we have no data on the spontaneous occurrence of epithelioma in roe deer.

This then is the basis of the important generalisation, that horses, sheep and deer have developed an environmental type of arsenic cancer. It is desirable that such statements should be examined before they are finally built into the permanent fabric of textbook tradition, from which they cannot by any possibility be eradicated.

Notes and News

University of Cambridge

At recent examinations the following were successful:

FINAL EXAMINATION FOR M B

Part I: Surgery, Midwifery and Gynæcology.—F. Ashton, E. H. Back, R. A. J. Baily, H. W. Balme, R. F. Barlow, D. R. Barnes, C. H. Barnett, G. M. Barrett, W. M. Bennett, G. G. B. Blackman, R. H. Boardman, J. F. Bolton Carter, D. L. Bridgewater, A. J. Briggs, W. L. Calnan, A. Carpenter, M. C. Connell, J. Davenport, E. W. Deane, M. B. Devas, R. J. Dickson, W. A. dos Santos, D. H. Drennan, C. O. Edwards, J. W. Evans, J. W. Fawcett, W. M. Foreman, R. M. Forrester, H. A. Fraser, A. G. Freeman, D. S. G. Genge, R. N. R. Grant, H. C. Gupta, B. Haigh, J. R. Handforth, J. Hardy, E. H. Hare, H. Harris, M. Hemming, J. K. Hinds, P. Holliday, A. E. Howarth, P. H. Huggill, D. M. Jeffreys, P. F. Jones, R. N. Jones, D. A. G. Kaye, H. W. H. Kennard, A. Lask, J. O. Laws, J. Lister, J. C. Lloyd, R. E. Loder, V. U. Lutwyche, C. S. McKendrick, A. I. MacLeod, D. H. Makinson, P. G. Mann, A. S. Mason, H. C. Mason, J. K. F. Mason, R. G. May, F. S. Mellows, R. B. Meyer, P. H. Mitchell, D. A. Mitchison, J. R. Moffat, G. M. J. Nicholl, J. E. Oliver, J. H. C. Phillips, J. M. Potter, E. J. T. Prettejohn, A. P. H. Randle, J. R. Robinson, K. C. Robinson, P. H. Rogers, P. H. Schurr, E. L. Simons, A. N. Smith, T. R. Steen, R. V. Stone, R. G. Tasker, S. Tischler, W. H. Townsend, J. D. Trethowan, L. R. Twentyman, B. P. Webber, M. E. Wehner, D. Whitfield, E. H. Williams, P. A. O. Wilson, O. H. Wolff, R. G. Woodsend, W. D. Wylie and S. Young.

University of Manchester

At recent examinations the following were successful:

FINAL EXAMINATION FOR MB, CH B

Shirley G. Barrett (Mrs. Ashton), Samuel Falk, A. I. Goodman, Stanley Grace, Raymond Greenwood, Hyme Lempert and John Whewell.

Part I.—J. R. Archibald, H. L. Brisk, Jack Hinchliffe, and S. B. Rampling.

University of Dublin

The board of Trinity College has invited Dr. J. M. O'Connor, professor of physiology in University College, Dublin, to deliver the John Mallet Purser lecture in 1943.

On Dec. 9 at the school of physic, Trinity College, the following degrees were conferred:

MD.—J. C. Gaffney and C. B. Robinson.

MB, BCh, BAO.—K. H. Anderson, Ivy K. Bayne, Rena Becker, Brenda R. Boydell, G. R. Connolly, J. W. Dignan, C. K. Elliott, J. M. Hanrahan, Hannah E. Hinchcliff, G. A. M. Lee, Basil Marcus, L. T. H. Mills, Lavinia F. Nightingale, F. M. Lanigan-O'Keeffe, A. V. Poots, R. O. D. Reid, N. L. Smith, M. G. Jackson-Smyth and R. T. Towson.

Courses on Industrial Nursing

The Nuffield Provincial Hospitals Trust has given a grant for industrial nursing courses to be held outside London, and the Royal College of Nursing, in conjunction with the University, has arranged for the first of these to be held at Glasgow on March 1, 1943. Further particulars may be had from Miss F. N. Udell, Scottish Board, 40, Melville Street, Edinburgh, 3.

A Factory Antenatal Service

At a meeting on Dec. 11 of the maternity and child welfare group of the Society of Medical Officers of Health, with Dr. Catherine Morris Jones, the president, in the chair, an experiment by which an antenatal and gynæcological clinic was established within the precincts of a factory was described by Dr. L. B. Bourne, medical officer to the factory, and Mr. J. V. O'Sullivan, consultant to the works clinic. The clinic is situated in premises outside the workshops and can be visited by women unknown to their fellow-workers. An appointment system prevents waste of time, and the medical staff are able by their knowledge of the woman's condition of health to modify her working hours immediately when necessary. Mr. O'Sullivan commented on the continued good health of most of the women, who carried on their work of making radio parts up to a late stage of pregnancy. Fatigue he thought could usually be ascribed to the strain of shopping and home duties carried out in addition to the factory work, rather than to the work itself. The speakers put forward their pioneer experiment as a war-time measure only, but claimed that it had already justified its existence by lessened absenteeism and improved team-work among the workers. The clinic was popular among the women.

Anglo-Iranian Pharmaceutical Company

This company has been formed by five manufacturers of medicinal products to facilitate the supply to Iran of pharmaceutical products produced in the United Kingdom. The constituent members are Boots Pure Drug Company, British Drug Houses, Evans Sons Lescher and Webb, Glaxo Laboratories and The Wellcome Foundation. The registered office of the company is Tavistock House South, Tavistock Square, London, W.C.1.

"... the question might be raised whether at the present state of the practice of surgery a surgeon should any longer concern himself with these questions of anæsthesia, or leave them in the hands of the anæsthesiologists. My feeling is that there are as yet too few of them, and that we still must concern ourselves with the subject of anæsthesia because I find that when a patient dies under an anæsthetic I am the person who has to tell the family. ..."—Dr. F. A. COLLER, *Ann. Surg.* 1942, **116**, 564.

Appointments

GILLIS, LEON, MB WITWATERSRAND, MCH ORTH LPOOL, FRCSE, DLO: medical superintendent, Borough General Hospital, Ipswich.

HERN, J. R. B., DM OXFD, MRCP: physician to inpatients, London Chest Hospital.

SALINGAR, E. L., MB LPOOL, FRCSE: RSO at Warrington Infirmary.

STAUNTON, E. G., MB NUI: RSO Beckett at Hospital, Barnsley.

Colonial Medical Service.—The following appointments are announced:—

CHEVERTON, R. L., MRCS: DMS, Cyprus;
CRONYN, H. D., FRCSE, DTM & H: specialist surgeon, Cyprus;
EDDY, T. P., MRCS: MO, Gambia;
EVANS, H. S., BA CAMB., MRCS: MO (Grade I), Fiji.
HETHERINGTON, H. B., MB TORONTO: DMS, British Guiana.

Births, Marriages and Deaths

BIRTHS

CHAPPEL.—On Dec. 12, the wife of Dr. H. M. Chappel, of Minehead—a daughter.

KERBY.—On Dec. 14, at Reading, the wife of Dr. T. R. F. Kerby—a son.

LESSER.—On Dec. 11, at Wakefield, the wife of Captain S. A. H. Lesser, RAMC—a son.

MCCULLAGH.—On Dec. 10, at Cambridge, the wife of Surgeon Commander Graham McCullagh, RNVR—a daughter.

NASSIM.—On Dec. 10, in London, the wife of Lieutenant Reginald Nassim, RAMC—a son.

PHILLIPS.—On Dec. 13, at Hemel Hempstead, to Violet (*née* Hatfeild), wife of Dr. E. S. Phillips—a daughter.

MARRIAGES

NEWBY—STRANGE.—On Dec. 12, at Stevenage, Robert Newby, to Margaret Miriam Strange, MB.

SHAWYER—JAMIESON.—On Dec. 12, at Guildford, Robert Anderson Shawyer, BM, to Elizabeth Jamieson.

DEATHS

COLBECK.—On Dec. 16, at Farnborough, Hants, Edmund Henry Colbeck, OBE, MD CAMB., FRCP, in his 78th year.

CRIPPS.—On Dec. 16, at Bournemouth, Charles Couper Cripps, MD DURH., aged 88.

POYNDER.—On Dec. 13, at Wootton St. Lawrence, Hants., George Frederick Poynder, MRCS, lieut.-colonel RAMC retd., aged 90.

PUCKLE.—On Dec. 13, at Churchstoke, Montgomery, Selwyn Hale Puckle, BA CAMB., MB EDIN., JP, aged 83.

RUCK.—On Dec. 11, at Sapperton, Cirencester, David Naunton Ruck, LRCP, late of Ealing, aged 82.

ANOREXIA IN CHILDHOOD

Among the many complaints of childhood on which medical advice is sought, anorexia with associated cessation of gain in weight, is probably the most common.

Of the likely causes of this lack of appetite, dietary deficiency, particularly hypovitaminosis B_1, is, according to many authorities, the most important. Anorexia associated with gastro-intestinal atony is certainly the earliest and most constant sign of vitamin B_1 deficiency and its presence, by lessening the intake and decreasing the absorption of food, tends to establish a vicious circle in which the tissue content, not only of vitamin B_1, but of the other essential food factors is progressively lowered.

THE EFFECT OF INCREASED VITAMIN B_1

Controlled clinical trials have shown that the administration of vitamin B_1 is specific in preventing and curing anorexia and associated gastro-intestinal functional disturbances such as atony, constipation and diarrhœa when these are of nutritional origin. Since other factors of the vitamin B complex may be implicated in such syndromes, the whole B complex has been recommended,[1] and it is common practical experience that a course of treatment with Bemax leads to rapid and striking improvement in the clinical picture.

In deficiency states the lack of more than one food factor is nearly always present, so that, in treatment a combination of the known vitamins should generally be administered. This is a further sound reason why, in treating anorexia of childhood with the vitamin B complex, Bemax should be employed.

THE MULTIPLE FACTORS OF BEMAX

Bemax is not only the richest available natural source of the vitamin B complex; it provides also important amounts of vitamins A and E. Furthermore, it is rich in assimilable iron and in protein of first-class biological value.

Since, even under normal peace-time conditions, it was not a simple matter to construct a dietary providing the optimal adult intake of vitamin B_1, and since the daily vitamin requirements of children are much higher than those of adults, the provision of Bemax to young children offers the best prophylaxis against anorexia and associated sequelæ of hypovitaminosis B. Similarly, when such conditions are already developed, Bemax therapy is a most rapid and effective means of cure.

[1] *J. Amer. Med. Assoc.*, 1938, 110, 953.

Further particulars concerning Bemax sent on request. *Vitamins Ltd. (Dept. L.D.), 23, Upper Mall, London, W.6.*

The use of Befortiss in high dosage vitamin B therapy

Massive doses of pure Vitamin B_1 are required in deficiency polyneuritis. They relieve pain in certain cases of trigeminal neuralgia and the neuralgia of herpes zoster. Such doses are best given as Befortiss ampoules, 25 mg., 10 mg. or 2 mg.

* * *

Clinical experiments with vitamin B_6 (J.A.M.A. 115.3.209) show its effects in toxic peripheral neuritis, and on the hæmopoietic system (*Nature*, 1940, 145, 388). Its effect on the skin is well known. Vitamin B_6 and other factors of the B complex are present with vitamin B_1 in Befortiss Tablets. Befortiss Tablets are available in two strengths—200 i.u. per gramme and 2 mg. (666 i.u.) per gramme.

Further particulars concerning Befortiss from Vitamins Ltd. (Dept. L.B.E.), 23, Upper Mall, London, W.6.

Improving the Breast Milk

It is now established that where the mother's diet is low in protective factors for some time the milk becomes low in them also. It is established, too, that additional cow's milk, which supplies vitamin A and calcium satisfactorily, is inadequate as regards iron, vitamin B_1 and vitamin C. A deficiency of vitamin B_1 in the breast milk results in poor appetite in the infant and opens the way to a series of digestive disturbances. The breast-fed baby also often relies entirely on its mother for vitamin C, for which she had previously been accustomed to taking fruit.

Enriching the mother's diet with vitamin B_1 and vitamin C is rapidly followed by an increase of these factors in the milk.

Pregnavite affords the most convenient and economical means of supplementing the diet with vitamins and mineral salts during pregnancy and lactation. Its wide range of protective factors makes it the best means of increasing the mother's reserves.

Pregnavite *contains*—

Vitamins A, B_1, C, D and E; Calcium, Iron & Phosphorus

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Why Electrolytic?

"It is possible to obtain a solution even less irritating than Dakin's solution if we prepare it by the electrolytic method. Electrolytic Hypochlorite has not hitherto been employed in surgery on account of its defective keeping properties."

Carrel and Dehelly Military Medical Manuals, "The Treatment of Infected Wounds," 2nd Edition (1918), p. 24

Why Milton?

Because *Milton*, the only stable brand of Electrolytic Sodium Hypochlorite, retains its effective strength for several years; and

Because *Milton*, either full strength or in the dilutions commonly employed, is far less alkaline than Dakin's solution of comparable strength.

Milton 1 *in* 20, *for example, has a pH of* 8·89. *Dakin's solution* 1 *in* 10 (*which has the same content of available chlorine and hence the same oxidising power*) *has a pH of* 10·64. Milton (*full strength*) *has a pH of* 10·7. *Dakin's solution* (*full strength*), *which has half the content of available chlorine, has a pH of* 11·61.

Because recent work emphasises the lack of irritant action (this is largely due to the absence of free caustic alkali). One surgeon gives as his reason for preferring an electrolytically prepared hypochlorite to a chemically produced solution the fact that after its action is completed only a saline residue remains, "whereas chemically prepared varieties, such as Dakin's solution, have more irritant end products."[1] Another states, "Eusol for treatment in the wards has been replaced by *Milton* solution in the strength of 1 in 20. This gives an isotonic solution, is quite painless and has the advantage that when its hypochlorite element has finished action only normal salts are left. It was found that the boric acid left from Eusol tended to make the wounds somewhat painful and slightly boggy."[2]

For blandness, stability, low alkalinity combined with effective proteolytic action and innocuousness of end products the choice is—'Milton.'

1. "*Treatment of Burns by Envelope Irrigation*," *British Medical Journal, July 12th*, 1941, *p.* 47.
2. "*Experiences in an E.M.S. Base Hospital in the London Area*," *Edinburgh Medical Journal, January*, 1942, *pp.* 25–26.

★ *For quotations for Bulk Supplies for Hospitals, etc., or information with regard to irrigation technique, write Milton Antiseptic Ltd., John Milton House, London, N.7.*

MILTON, the stable brand of Electrolytic Sodium Hypochlorite, non-caustic and of standard strength (1%)

Cod Liver Oil in nutrition

Before the war leading Medical opinion at home and abroad agreed that even then a daily teaspoonful of Cod Liver Oil was needed to supplement the diets of infants, children, adolescents, and nursing and expectant mothers. The pre-war *Report on the Physiological Bases of Nutrition* 1936, setting down these conclusions and recommendations was endorsed by our own Ministry of Health and the British Medical Research Council.

Since the outbreak of the war the Ministry of Food have taken steps, with their Cod Liver Oil Distribution Scheme, to ensure that adequate supplies are to-day within the reach of young children.

But the Ministry of Food Scheme needs the active co-operation and support of the Medical Profession in recommending mothers to take advantage of these facilities and in getting them to appreciate the importance and value of Cod Liver Oil in pre-natal care and throughout childhood and adolescence.

For those outside the scheme, and also for those who prefer freedom of choice, SevenSeaS pure Cod Liver Oil is available in all chemists' shops throughout the country. There is no shortage of SevenSeaS, and its quality and purity remain unimpaired. The Medical Profession may therefore prescribe SevenSeaS with confidence and with the knowledge that supplies are readily at hand and are not restricted in any way.

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BRITISH POSTGRADUATE MEDICAL SCHOOL
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RECENT ADVANCES IN THE MEDICAL ASPECTS OF WAR INJURIES—from 4th–8th January, 1943

Monday, 4th Jan.	10 A.M.	Hæmorrhage and Transfusion.	Dr. E. P. Sharpey-Schafer, B.Chir., M.R.C.P.
	11.30 A.M.	Fat Embolism	Dr. Robb-Smith, M.D., M.R.C.S., L.R.C.P.
	2 P.M.	Recent Advances in Transfusion Problems.	Dr. Janet Vaughan, D.M., F.R.C.P.
Tuesday, 5th Jan.	10 A.M.	Traumatic Anuria (I) ..	Dr. Bywaters, M.B., B.S., M.R.C.P.
	12 NOON	Traumatic Anuria (II) ..	Prof. J. H. Dible, M.B., Ch.B., F.R.C.P.
	2 P.M.	Clinical Aspects of Shock..	Dr. J. McMichael, M.D., F.R.C.P., F.R.S.E.
Wednesday, 6th Jan.	10 A.M.	(1) Pathology of War Gas Poisoning.	Prof. Cameron, D.Sc., F.R.C.P.
		(2) Eye Injuries due to War Gases.	Surg. Lieut. Leishman, R.N.V.R.
		(3) Some Recent Work on the Treatment of War Gas Poisoning.	Surg. Lieut.-Commander Foss, R.N.V.R.
	N.B.—Reserved for Officers of the Armed Forces in uniform.		
Thursday, 7th Jan.	10 A.M.	Immersion Foot	Surg. Commander C. C. Ungley, M.D., F.R.C.P.
	11.30 A.M.	Medical Aspects of Burns..	Prof. R. S. Pilcher, F.R.C.S.
	2 P.M.	Frostbite	Dr. Raymond Greene, M.R.C.S., L.R.C.P.
Friday, 8th Jan.	10 A.M.	Injuries of the Nervous System.	Major Ritchie Russell, M.D., F.R.C.P.
	2 P.M.	Chest Wounds	Lieut.-Colonel Dickson, R.C.A.M.C.

The fee for the Course will be one guinea, but no fee will be charged in the case of Officers of the Armed Forces who are nominated for the course by their respective Director-Generals. Applications for admission should be addressed to the DEAN, British Postgraduate Medical School, Ducane-road, W.12.

Further War Courses will commence as follows :—
SPECIAL PROBLEMS IN WAR SURGERY MONDAY, 18TH JANUARY, 1943.
WAR SURGERY OF THE NERVOUS SYSTEM MONDAY, 1ST FEBRUARY, 1943.
WAR MEDICINE COURSE .. .. MONDAY, 15TH FEBRUARY, 1943.

University of Glasgow and UNIVERSITY OF EDINBURGH.

ADMISSION TO FACULTIES OF MEDICINE.

The Universities of Glasgow and Edinburgh give notice that, under recently revised regulations of the Ministry of Labour and National Service, it will be necessary for all young men who intend to enter upon the study of Medicine in October, 1943, and who were born on or before 31st July, 1925, to make *immediate* application. Women applicants and men born after 31st July, 1925, are asked not to apply until 15th May.

All affected by this notice should complete at once a form of application to be obtained from the Registrar, The University, Glasgow, W.2, and the Dean of the Faculty of Medicine, The University, Edinburgh, respectively.

ROBT. T. HUTCHESON,
Registrar, University of Glasgow.
W. A. FLEMING,
December, 1942. Secretary, University of Edinburgh.

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FINAL EXAMINATION: SURGERY, January 11th, February 8th, March 8th, 1943; MEDICINE, January 18th, February 15th, March 15th, 1943; MIDWIFERY, January 19th, February 16th, March 16th, 1943.

For regulations apply REGISTRAR, Apothecaries' Hall, Black Friars-lane, London, E.C.4.

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This Registered Hospital is situated in 130 acres of park and pleasure grounds. Voluntary patients, who are suffering from incipient mental disorders or who wish to prevent recurrent attacks of mental trouble; temporary patients, and certified patients of both sexes are received for treatment. Careful clinical, bio-chemical, bacteriological, and pathological examinations. Private rooms with special nurses, male or female, in the Hospital or in one of the numerous villas in the grounds of the various branches can be provided.

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This is a Reception Hospital in detached grounds with a separate entrance, to which patients can be admitted. It is equipped with all the apparatus for the complete investigation and treatment of Mental and Nervous Disorders by the most modern methods: insulin treatment is available for suitable cases. It contains special departments for hydrotherapy by various methods, including Turkish and Russian baths, the prolonged immersion bath, Vichy Douche, Scotch Douche, Electrical baths, Plombieres treatment, etc. There is an Operating Theatre, a Dental Surgery, an X-Ray Room, an Ultra-violet Apparatus, and a Department for Diathermy and High-frequency treatment. It also contains Laboratories for bio-chemical, bacteriological, and pathological research. Psychotherapeutic treatment is employed when indicated.

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Two miles from the Main Hospital there are several branch establishments and villas situated in a park and farm of 650 acres. Milk, meat, fruit, and vegetables are supplied to the Hospital from the farm, gardens, and orchards of Moulton Park. Occupational therapy is a feature of this branch, and patients are given every facility for occupying themselves in farming, gardening, and fruit growing.

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At all the branches of the Hospital there are cricket grounds, football and hockey grounds, lawn tennis courts (grass and hard courts), croquet grounds, golf courses, and bowling greens. Ladies and gentlemen have their own gardens, and facilities are provided for handicrafts, such as carpentry, etc.

For terms and further particulars apply to the Medical Superintendent (TELEPHONE: No. 2356 and 2357 Northampton), who can be seen in London by appointment.

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Application form obtainable (stamped foolscap envelope necessary) from Medical Officer of Health (S.D.2) County Hall, S.E.1. Returnable by 11th January, 1943.

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Applications should reach the SECRETARY not later than Friday, the 8th January.

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FACTORIES ACT, 1937.

The following appointment as Examining Surgeon under the Factories Act, 1937, is vacant.

Applications should be sent to the CHIEF INSPECTOR OF FACTORIES, 28, Broadway, London, S.W.1.

District	*County*	*Latest date for receipt of application*
MITCHELDEAN ..	GLOUCESTER ..	5TH JANUARY, 1943

Middlesex County Council.

RESIDENT JUNIOR ASSISTANT MEDICAL OFFICER (B2) required for NORTH MIDDLESEX COUNTY HOSPITAL, Edmonton, N.18. Applications invited from registered medical practitioners. Male R practitioners qualified more than three months ineligible unless rejected by R.A.M.C. Salary £250 per annum, plus cost-of-living bonus. Board, lodging, and laundry. Whole-time general and surgical duties, such as Council may direct, under supervision of Medical Superintendent. Appointment, subject to medical examination and one month's notice, is for six months, with possibility of extension to twelve months (except in case of practitioners, men or women, liable under National Service Acts). Post vacant end of January.

Applications, stating age, nationality, qualifications with dates, present post, and previous appointments, to the Medical Superintendent of Hospital. No application forms provided. Relationship to any member or officer of the Council to be disclosed. Copies of not more than three recent testimonials. Canvassing, directly or indirectly, will disqualify. Closing date 2nd January, 1943.

C. W. RADCLIFFE, "B3," Clerk of the County Council.
Middlesex Guildhall, Westminster, S.W.1.

Middlesex County Council.

PHYSICIAN (B1) required for CENTRAL MIDDLESEX COUNTY HOSPITAL, Willesden, N.W.10. Applicants must be registered medical practitioners with a higher degree or diploma in medicine and extensive experience in treatment of acute medical conditions. Some preference given to those with knowledge of neurology and psychiatry. Commencing salary between £650 and £1000 per annum, according to qualifications and experience. No emoluments. Whole-time duties, such as Council may direct, will include charge of in-patient and out-patient department and teaching if required. Appointment is unestablished. Subject to medical examination and three months' notice. Salary is inclusive; any fees received must be paid to County Council. Post now vacant. Further particulars from Medical Superintendent.

Applications, stating age, nationality, qualifications with dates, present and previous appointments and experience, to the undersigned. No application forms provided. Relationship to any member or officer of Council to be disclosed. Copies of not more than three recent testimonials. Canvassing, directly or indirectly, will disqualify. Closing date 9th January, 1943.

C. W. RADCLIFFE, "B3," Clerk of the County Council.
Middlesex Guildhall, Westminster, S.W.1.

Middlesex County Council.

RESIDENT JUNIOR ASSISTANT MEDICAL OFFICER (B2) required for WEST MIDDLESEX COUNTY HOSPITAL, Isleworth, Middlesex. Applications invited from registered medical practitioners with some previous experience. Male R practitioners qualified more than three months ineligible unless rejected by R.A.M.C. Salary £250 per annum, plus cost-of-living bonus. Board, lodging, and laundry. Whole-time general medical duties, such as Council may direct, under supervision of Medical Superintendent. Appointment, subject to medical examination and one month's notice, is for six months, with possibility of extension to twelve months (except in case of practitioners, men or women, liable under National Service Acts). Post now vacant.

Applications, stating age, nationality, qualifications with dates, present post, and previous experience, to the Medical Superintendent, "B3," of Hospital. No application forms provided. Relationship to any member or officer of the Council to be disclosed. Copies of not more than three recent testimonials. Canvassing, directly or indirectly, will disqualify. Closing date 2nd January, 1943.

C. W. RADCLIFFE, Clerk of the County Council.
Middlesex Guildhall, Westminster, S.W.1.

Hospital for Consumption and

DISEASES OF THE CHEST, Brompton, S.W.3.

Applications are invited from registered medical practitioners (Male and Female), including those at present holding B1 posts provided that the permission of their present employing authorities is given, for the appointment of RESIDENT SURGICAL OFFICER (B1). Applicants must have held a resident hospital appointment and male R practitioners now holding A or B2 posts cannot be considered unless they have been rejected by the R.A.M.C. The appointment is for twelve months. Salary at the rate of £150 per annum, with board and residence, and an additional £25 per annum for services in connexion with paying patients.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of one or more recent testimonials, should reach the undersigned not later than Monday, 11th January, 1943. F. G. ROUVRAY, Secretary.
Brompton, December, 1942.

HIS MAJESTY'S COLONIAL SERVICE

THE COLONIAL MEDICAL SERVICE

VACANCIES FOR MEDICAL OFFICERS

The maintenance of an efficient Colonial Medical Service constitutes a vital part of the national war effort and it is most important that the Service should be assured of an adequate supply of doctors.

The Secretary of State for the Colonies therefore invites applications from doctors possessing a medical qualification registrable in the United Kingdom who are British subjects and who are under thirty-five years of age.

Medical Officers are appointed in the first instance for general service. But there are ample opportunities for work in special branches of medicine and surgery, in public health and in medical research.

The normal salary scale is from £600 to between £1,000 and £1,120. There are large numbers of super-scale posts to which promotion is made on merit and which carry higher salaries.

Government quarters, in many cases free of rent, and first-class passages to and from the Colonies are provided, and an adequate pension scheme is in force.

Selected candidates are normally required to attend a course of instruction in Tropical Medicine and Hygiene either before proceeding overseas or during their first period of leave.

Further particulars, including the regulations governing admission to the Colonial Medical Service, may be obtained from the Director of Recruitment (Colonial Service), 2, Park-street, London, W.1.

St. Mark's Hospital for Cancer, Fistula,

AND OTHER DISEASES OF THE RECTUM,
City-road, London, E.C.1.

Applications are invited from registered medical practitioners (Male) for the appointment of HOUSE SURGEON (B2), vacant on 1st February, 1943. The appointment is for six months. Salary is at the rate of £200 per annum, with full residential emoluments. Applications from R practitioners who have been qualified more than three months cannot be considered unless they have been rejected by the R.A.M.C.

Applications, stating full particulars, to—
RAYMOND BULL, Secretary.

Hospital of St. John and St. Elizabeth,

60, Grove End-road, N.W.8.

Applications are invited from registered medical practitioners (Male) for the appointment of a HOUSE PHYSICIAN (A), to become vacant on 4th January, 1943, including practitioners within three months of qualification who are liable to service under the National Service Acts, 1939–41. Appointment will be for a period of six months. Salary at the rate of £150 per annum, with full residential emoluments.

Applications, stating full particulars, to—
F. DUDLEY HOBBS, B.A., Secretary.

The Hospital for Sick Children,

Great Ormond Street, London, W.C.1, requires the services of a RADIOLOGIST, one having experience in the treatment of children preferred. Further particulars obtainable from—
H. F. RUTHERFORD, Secretary.

Borough of Barking.

TEMPORARY ASSISTANT MEDICAL OFFICER AND ASSISTANT SCHOOL MEDICAL OFFICER.

Applications are invited for the above appointment from qualified medical practitioners who must have had experience in public health work. The successful candidate will be required to pass a medical examination and contribute to the superannuation scheme. The salary scale is £500 per annum, rising by £25 per annum to £700 per annum, and a cost-of-living bonus is at present payable. The commencing salary will be within the grade, according to the experience of the successful candidate.

Application forms and particulars of the appointment are obtainable from the Medical Officer of Health, Town Hall, Barking, and applications, together with copies of three recent testimonials, must be returned to me in envelopes endorsed "Assistant Medical Officer of Health" not later than 12 NOON on Tuesday, 12th January, 1943.

Town Hall, Barking. E. R. FARR, Town Clerk.

Bodmin Hospital.

Applications are invited from registered medical practitioners, Male or Female, for the appointment of RESIDENT HOUSE SURGEON (B2). The salary is at the rate of £200 per annum, with full residential emoluments. Practitioners qualified more than three months and liable under the National Service Acts, 1939–41 (males must be rejected by the R.A.M.C.), may also apply when appointment is limited to six months.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be sent to the MEDICAL SUPERINTENDENT, Bodmin Emergency Hospital, Bodmin, Cornwall, as soon as possible.

Swansea General and Eye Hospital.

Applications are invited from registered medical practitioners, Male and Female, for the appointments of HOUSE PHYSICIANS (A), to become vacant in January. Salary is at the rate of £150 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts, 1939–41, may also apply, when appointment will be for six months.

Applications should be forwarded to—
O. C. HOWELLS, Secretary-Superintendent.

Sheffield Radium Centre.

Candidates are invited for the post of MEDICAL DIRECTOR of the Sheffield Radium Centre. The successful candidate will be expected to take the responsibility for all the Radium and X-ray Therapy of the Associated Hospitals, and for the follow-up and records of the patients. A first-class Radium Institute is to be built as soon as Government permission is obtained. The commencing salary will be £1500, with superannuation.

Applications, including full details of experience, qualifications, references, &c., should be sent to the undersigned not later than 31st December, from whom full details may be obtained.

Captain T. W. BARNARD, O.B.E., Secretary.
Sheffield Radium Centre, at The Royal Infirmary.

Royal South Hants and Southampton,

HOSPITAL. (255 Beds.)

Applications are invited from registered medical practitioners Male and Female, for the appointment of a HOUSE PHYSICIAN (A), now vacant. The appointment will be for a period of six months. Salary is at the rate of £175 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts, 1939–41, may also apply.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three testimonials, should be sent immediately to—
EDWARD L. WIRGMAN, House Governor.

Royal Hampshire County Hospital,

WINCHESTER. (462 Beds.)

Applications are invited from registered medical practitioners (Male and Female) for the appointment of RESIDENT RESUSCITATION OFFICER (B1), to become vacant immediately. Applicants should have held house appointments. Duties will include hospital transfusions, grouping and bleeding of blood donors. The post will offer excellent opportunities for experience in general pathological work. Salary is at the rate of £200 per annum, with full residential emoluments. R practitioners holding A or B2 posts and rejected by the R.A.M.C. may also apply.

Applications, stating age, qualifications with dates, and nationality, together with copies of three recent testimonials, should be sent immediately to—
H. EWART MITCHELL, Superintendent and Secretary.
14th December, 1942.

Walsall General Hospital. (181 Beds.)

Applications are invited from registered medical practitioners, Male and Female, for the appointment of HOUSE SURGEON (A), to become vacant shortly. Salary is at the rate of £150 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts, 1939–41, may also apply when appointment will be for six months.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be forwarded immediately to—
R. C. MILLWARD, House Governor.

Royal Gwent Hospital, Newport, Mon.

(Total 341 Beds.)

Applications are invited from Male registered medical practitioners for the appointment of HOUSE PHYSICIAN (B2), to become vacant on 31st January, 1942. Duties will include attendance in the V.D. Department of the Hospital. Salary is at the rate of £210 per annum, with full residential emoluments. Practitioners qualified more than three months and liable under the National Service Acts, 1939–41 (males must be rejected by the R.A.M.C.), may also apply when appointment is limited to six months.

Applications, stating age, nationality, qualifications with dates, and details of previous appointments, accompanied by three recent testimonials, should be sent at once to—
ALAN RUDDLE, Secretary-Superintendent.
16th December, 1942.

County Borough of Stockport.

PUBLIC HEALTH AND ASSISTANCE COMMITTEE.

Applications are invited from duly qualified medical Women for the position of LADY ASSISTANT MEDICAL OFFICER for Maternity and Child Welfare. The officer appointed will be required to assist the Medical Officer of Health in carrying out the Council's Maternity and Child Welfare Scheme and such other duties from time to time as directed by the Council. She will be required to devote her whole time to the service of the Council. Applicants must be registered medical practitioners, and possess the Diploma of Public Health or similar qualification. Preference will be given to candidates who have had experience in diseases of women and children and in maternity and child-welfare work. The salary will be at the rate of £600 per annum inclusive, rising by annual increments of £25 to a maximum of £700 per annum inclusive, plus (at the present time) an increased cost-of-living bonus of £24 on the commencing salary. The candidate appointed will be required to pass a medical examination, and will be subject to the provisions of the Local Government Superannuation Act, 1937. Forms of application, and particulars as to the terms and conditions of the appointment, may be obtained from the Medical Officer of Health, Town Hall, Stockport. Canvassing, directly or indirectly, will be a disqualification.

Applications, accompanied by copies of three recent testimonials and endorsed "Assistant Medical Officer," should reach the undersigned not later than the first post on Monday, 11th January, 1943.

J. YULE, M.D., D.P.H., Medical Officer of Health.

Town Hall, Stockport, December, 1942.

Lancashire County Council.

The Lancashire County Council invite applications for the temporary appointment of a Whole-time VENEREAL DISEASES OFFICER.

The salary will be at the rate of £750 per annum, rising by annual increments of £50 to £850 per annum, subject to satisfactory service. Travelling expenses in accordance with the scale of the County Council will be allowed. The appointment will be terminable by one month's notice on either side.

Applicants must be registered medical practitioners and have specialised experience in the diagnosis and treatment of Venereal Diseases. The officer appointed will be required to work under the direction of the County Medical Officer of Health.

Form of application and further particulars may be obtained from County Medical Officer of Health, Public Health Department, County Offices, Preston, to whom all applications should be sent, accompanied by two recent testimonials, not later than the 22nd January, 1943.

GEORGE ETHERTON, Clerk of the County Council.

County Offices, Preston, 17th December, 1942.

Bootle General Hospital, Bootle,

LIVERPOOL, 20.

ONE GENERAL HOUSE SURGEON (A) AND ONE ORTHOPÆDIC AND SPECIALS HOUSE SURGEON (A).

Applications are invited from registered medical practitioners, Male and Female, for the above appointments, to become vacant on the 1st January, 1943. Salary in each case is at the rate of £150 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts, 1939–41, may also apply when appointments will be for six months; otherwise they will be for a period of six months with possibility of extension.

Applications and testimonials should be sent to the SUPERINTENDENT.

City of Plymouth.

CITY GENERAL HOSPITAL.

Applications are invited from duly qualified and registered medical practitioners (Male and Female) for the appointment of JUNIOR ASSISTANT MEDICAL OFFICER (A) at the City General Hospital, Plymouth. The appointment will be for a period of six months and terminable by one month's notice on either side. Salary is at the rate of £250 per annum, with full residential emoluments. All fees received by the officer must be refunded to the Council. Practitioners within three months of qualification and liable under the National Service Acts, 1939–41, may also apply. Further details may be obtained from the Medical Superintendent.

Forms of application may be obtained from the undersigned and should be forwarded, together with copies of not more than three recent testimonials, as soon as possible.

T. PERSON, Medical Officer of Health.

Seven Trees, Lipson-road, Plymouth.

The General Infirmary at Leeds.

Applications are invited from registered medical practitioners, Male and Female, for the post of HONORARY ANÆSTHETIST AND ASSISTANT THORACIC ANÆSTHETIST. The post will be associated with the Thoracic Surgical Centre under the Emergency Medical Service, and salary will be governed by the experience of the applicant. Applications from Male R practitioners now holding A, B1, or B2 posts cannot be considered unless they have been rejected by the R.A.M.C. Candidates must be fully qualified.

Applications to be received not later than 10th January, 1943, by: S. CLAYTON FRYERS, House Governor and Secretary.

Royal Victoria Infirmary, Newcastle

UPON TYNE.

Applications are invited from registered medical practitioners, Male and Female, for the appointments of MEDICAL REGISTRAR and SURGICAL REGISTRAR (B1) (open appointments). Applicants should have held house appointments and preference will be given to candidates holding diploma of M.R.C.P. (London) for Medical Registrar and F.R.C.S. (England) for Surgical Registrar. Salary is at the rate of £300 per annum, non-resident. R practitioners holding A or B2 posts and rejected by the R.A.M.C. may also apply.

Applications, stating age, nationality, qualifications with dates, experience, and details of previous appointments, and accompanied by copies of three recent testimonials, should be sent as soon as possible to—

A. W. SANDERSON, House Governor.

16th December, 1942.

The Stamford, Rutland and General

INFIRMARY.

Applications are invited from registered medical practitioners, Male and Female, for the appointment of RESIDENT SURGICAL OFFICER (B2), vacant on 1st February, 1943. The salary is at the rate of £220 per annum, with full residential emoluments. Practitioners qualified more than three months and liable under the National Service Acts, 1939–41 (males must be rejected by the R.A.M.C.), may also apply when appointment is limited to six months; otherwise three months.

Applications, stating age, qualifications with dates, nationality, and present post, and accompanied by copies of three testimonials, should be sent not later than 9th January, 1943, to—

Stamford, Lincs. H. F. DONALD, Secretary.

County Borough of Ipswich.

Applications are invited from registered medical practitioners for the post of TEMPORARY ASSISTANT MEDICAL OFFICER. A public health degree or diploma is desirable. The duties will be mainly in connexion with the Maternity and Child Welfare and the School Medical Services, together with such other duties as the Medical Officer may direct. The salary will be £600 per annum, rising by annual increments of £25 to £700.

Completed applications, accompanied by not more than three recent testimonials and endorsed "Assistant Medical Officer," should be submitted to the Medical Officer of Health, Elm-street, Ipswich, at the earliest possible moment.

Town Hall, Ipswich. A. MOFFAT, Town Clerk.

Royal Albert Edward Infirmary and

DISPENSARY, WIGAN.

(Normally 219 Beds.)

The Board of Management invites applications for the appointment of a TEMPORARY VISITING RADIOLOGIST (Part-time). The remuneration for the appointment will be at the rate of £500 per annum, subject to six morning sessions per week at the Hospital being arranged.

Further information may be obtained from the undersigned, to whom applications should be addressed, together with three copies of recent testimonials. Canvassing in any form is prohibited.

A. STANLEY BRUNT,
General Superintendent and Secretary.

Chester Royal Infirmary.

(Normal Capacity 225 Beds.)

Applications are invited from registered medical practitioners, Male and Female, for the appointment of a GENERAL HOUSE SURGEON (A) AND ORTHOPÆDIC HOUSE SURGEON (A), to become vacant on the 1st February, 1943. The post of General House Surgeon is approved in connexion with the M.S. (London University) and the F.R.C.S. (England) examinations. Salary is at the rate of £150 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts, 1939–41, may also apply. The appointment will be for six months.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be sent not later than 14th January, 1943, to—

W. H. GRACE, M.D., F.R.C.P.,
Honorary Secretary, Medical Committee.

County of Warwick.

WARWICK HOSPITAL.

Applications are invited from registered medical practitioners (Male and Female) for the appointment of SURGICAL REGISTRAR (B1) at the Warwick Hospital which is likely to become vacant in the near future. Applicants should have held house appointments and should be a Fellow of one of the Royal Colleges of Surgeons. Salary £500 per annum, together with the usual residential emoluments. If accommodation is not provided at the Hospital a non-resident allowance at the rate of £100 per annum will be made. R practitioners holding A or B2 posts and rejected by the R.A.M.C. may also apply.

Application should be made on forms which may be obtained from the Public Assistance Officer, Shire Hall, Warwick, and should be returned to him on completion not later than Thursday, the 7th January, 1943.

L. EDGAR STEPHENS, Clerk of the Council.

Shire Hall, Warwick, 15th December, 1942.

Rochdale Infirmary, Lancs. (110 Beds.)

The Board of Management invite applications from registered medical practitioners, Male or Female, for the appointments of—

HOUSE PHYSICIAN (A), vacant shortly. Duties include work in ophthalmic, aural, and special departments, as well as medical clinics, and affords excellent opportunity for experience.

SECOND HOUSE SURGEON (A), vacant shortly.

Salaries are at the rate of £150 per annum, with full residential emoluments.

The successful candidates must be members of a Medical Defence Society.

Practitioners within three months of qualification and liable under the National Service Acts, 1939–41, may also apply, when appointments will be for six months.

Applications, stating age, nationality, qualifications, and accompanied by copies of testimonials, to: W. WYNNE, Secretary.

Coventry and Warwickshire Hospital.

Applications are invited from registered medical practitioners, Male and Female, for the appointment of a **HOUSE SURGEON (B2)**, vacant on 1st January, 1943. The appointment is for six months. Salary is at the rate of £150 per annum, plus £20 cost-of-living bonus, with full residential emoluments. Practitioners qualified more than three months and liable under the National Service Acts, 1939–41 (males must be rejected by the R.A.M.C.), may also apply.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be sent immediately to—

S. CECIL HILL, House Governor and Secretary.

Coventry and Warwickshire Hospital.

Applications are invited from registered medical practitioners, Male and Female, for the appointment of **HOUSE SURGEON (A)**, vacant on 1st January next. The appointment is for six months. Salary is at the rate of £150 per annum, plus £20 cost-of-living bonus, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts, 1939–41, may also apply.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be sent immediately to—

S. CECIL HILL, House Governor and Secretary.

Huddersfield Royal Infirmary.

(321 Beds.)

Applications are invited for the combined appointment of **HOUSE PHYSICIAN AND HOUSE SURGEON (B2)** to the **EAR, NOSE, THROAT, AND EYE DEPARTMENT.** Duties to commence as soon as possible. Salary at the rate of £187 10s., with full residential emoluments. Practitioners qualified more than three months and liable under the National Service Acts, 1939–41 (males must be rejected by the R.A.M.C.), may also apply when appointment will be for six months.

Applications should be sent as soon as possible to—

H. J. JOHNSON, General Superintendent and Secretary.

Rotherham Hospital.

(General Voluntary Hospital, 140 Beds.)

Applications are invited from registered medical practitioners for the following appointments, vacant 1st January, 1943:—

CASUALTY OFFICER AND ORTHOPÆDIC SURGEON (B2). Salary £225 per annum, with full residential emoluments. Practitioners qualified more than three months and liable under the National Service Acts, 1939–41 (males must be rejected by the R.A.M.C.), may also apply.

HOUSE PHYSICIAN (A). Salary £200 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts, 1939–41, may also apply.

Appointments will be for six months.

Applications for the above posts, stating age, qualifications with dates, nationality, experience, accompanied by copies of recent testimonials, should be sent at once to—

T. H. FLETCHER, Secretary-Superintendent.

Royal West Sussex Hospital,

CHICHESTER. (334 Beds.)

Applications are invited from registered medical practitioners for the appointment of **RESIDENT CASUALTY OFFICER (A)**, now vacant, including those within three months of qualification and liable under the National Service Acts, 1939–41. The appointment will be for six months. Salary £120 per annum, with full residential emoluments.

Apply immediately to: K. H. WILLIAMS, Secretary.

Surrey County Council.

SURREY COUNTY SANATORIUM, MILFORD, Near GODALMING. (348 Beds.)

Applications are invited from registered medical practitioners, Male and Female, for the appointment of **JUNIOR ASSISTANT MEDICAL OFFICER (B2)**. Salary is at the rate of £250 per annum, plus full residential emoluments. Practitioners qualified more than three months and liable under the National Service Acts, 1939–41 (males must be rejected by the R.A.M.C.), may also apply when appointment is limited to six months; otherwise not to exceed one year.

Apply to MEDICAL SUPERINTENDENT.

West Sussex County Council.

ST. RICHARD'S (PUBLIC HEALTH) HOSPITAL, CHICHESTER. (678 Beds.)

Applications are invited from registered medical practitioners (Male and Female) for the appointment of **RESIDENT MEDICAL OFFICER (B1)** in connexion with the M.S. Hospital Scheme. Applicants should have held house appointments. Salary at the rate of £350 per annum, with full board, lodging, and laundry. R practitioners holding A or B2 posts and rejected by the R.A.M.C. may also apply.

Applications, stating age, nationality, qualifications with dates, experience, and details of previous appointments, accompanied by copies of not more than three recent testimonials, should be sent to: T. C. HAYWARD, Clerk of the County Council.

County Hall, Chichester, 8th December, 1942.

Weymouth and District Hospital,

DORSET.

Applications are invited from registered medical practitioners (Male or Female) for appointment of **SECOND HOUSE SURGEON (A)**, including practitioners within three months of qualification and liable under National Service Acts, 1939–41. Appointment of six months' duration. Salary £140 per annum, with full residential emoluments.

Fully detailed applications, with copies of testimonials, to be addressed to the SECRETARY AND SUPERINTENDENT of the Hospital as early as possible.

Leeds Public Dispensary and Hospital.

Applications are invited from registered medical practitioners for the following resident posts:—

Two HOUSE PHYSICIANS (A). Appointment for six months. Salary at the rate of £150 per annum, with residence, board, and laundry. Practitioners within three months of qualification and liable under the National Service Acts, 1939–41, may also apply.

Applications, stating age, nationality, and qualifications, and accompanied by three recent testimonials, to be sent immediately to: CHARLES F. J. MAURY, Secretary and Superintendent.

Exeter City Hospital.

Applications are invited from Male registered medical practitioners for the appointment of **HOUSE SURGEON (A)**, vacant on 1st February, 1943. Salary is at the rate of £200 per annum, with usual residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts, 1939–41, may also apply when appointment will be for six months; otherwise not exceeding one year.

Applications, stating age, qualifications with dates, and nationality, accompanied by copies of two recent testimonials, should be sent forthwith to—

G. B. PAGE, Medical Officer of Health.

5, Southernhay West, Exeter, 8th December, 1942.

Royal Isle of Wight County Hospital,

RYDE, I.W.

Applications are invited from registered medical practitioners, either sex, for the appointment of a **HOUSE PHYSICIAN AND CASUALTY OFFICER (B2)**, to become vacant on 16th January next. The appointment will be for six months. Salary at the rate of £174 a year, with board, residence, and laundry. Practitioners qualified more than three months and liable under the National Service Acts, 1939–41 (males must be rejected by the R.A.M.C.), may also apply.

Applications stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be sent without delay to—

A. S. GORDON, Secretary.

Kettering and District General HOSPITAL.

Applications are invited from registered practitioners, Male and Female, for the appointments of **HOUSE SURGEON (A)** and **HOUSE PHYSICIAN (A)**, vacant during or at the end of January, 1943. Salary is at the rate of £200 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts, 1939–41, may also apply when appointment will be for six months.

Applications, stating age, nationality, qualifications, and accompanied by copies of testimonials, to the SECRETARY-SUPERINTENDENT.

Aberdeen Royal Infirmary.

Applications are invited from registered medical practitioners, Male or Female, for the full-time resident appointment of **MEDICAL REGISTRAR (B2)**, to become vacant on 1st February, 1943. Practitioners qualified more than three months and liable under the National Service Acts, 1939–41 (males must have been rejected for service in the R.A.M.C. or have obtained the sanction of the Scottish Central Medical War Committee), may also apply when the appointment will be limited to six months; otherwise for a period of one year. The salary is at the rate of £300 per annum.

Particulars of the appointment may be obtained from the undersigned, with whom applications and three copies of testimonials must be lodged on or before 4th January, 1943.

JOHN A. MCCONACHIE, Clerk and Treasurer.

1, Albyn-place, Aberdeen.

Northamptonshire County Council.

Applications are invited from registered Women medical practitioners for the post of TEMPORARY WHOLE-TIME ASSISTANT MEDICAL OFFICER. Duties will be in connexion with the maternity and child welfare and school medical services and the officer will be required to undertake such other duties as the County Medical Officer of Health may direct. Special experience of practical midwifery and antenatal work in a maternity hospital will be considered an additional recommendation. Salary will be at the rate of £500 per annum, rising by annual increments of £25 to £700 per annum, together with travelling allowance according to the County Council's scale. The appointment will be subject to one month's notice on either side. The officer appointed must provide a car for which mileage allowance will be paid on the County scale.

Applications, stating age, nationality, qualifications, and experience, with copies of three recent testimonials, should be sent not later than 2nd January, 1943, to—

C. M. SMITH, County Medical Officer of Health.

County Health Department, Guildhall-road, Northampton, 10th December, 1942.

Derbyshire Education Committee.

TEMPORARY ASSISTANT SCHOOL MEDICAL OFFICER (MALE OR FEMALE).

Applications are invited for the above appointment at a salary of £550 per annum, rising by annual increments of £25 to £700, with a travelling allowance in accordance with the County scale. Candidates must be registered medical practitioners of at least three years' standing. The duties will include work under the maternity and child welfare service, and experience in this work and in mental deficiency is desirable. The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination. The officer appointed will not be allowed to engage in private or consulting practice, but will be required to devote the whole time to the duties of the office and will act under the direction of the School Medical Officer. The appointment will be terminable by three months' notice on either side.

Application forms may be obtained from the undersigned to whom they should be returned on or before 7th January, 1943.

W. M. ASH, School Medical Officer.

County Offices, St. Mary's Gate, Derby.

County Council of the West Riding of YORKSHIRE.

MIDDLETON-IN-WHARFEDALE SANATORIUM AND HOSPITAL. (600 Beds.)

Applications are invited from registered medical practitioners ineligible for military service for the post of TEMPORARY DEPUTY MEDICAL SUPERINTENDENT (B1) at the Middleton-in-Wharfedale Sanatorium and Hospital, near Ilkley. The successful candidate will be required to reside at the Sanatorium. Married quarters are not available. Candidates must have held resident hospital appointments, and have had experience in general medicine and in the diagnosis and treatment of tuberculosis. Preference will be given to candidates who hold, or are studying for, a higher qualification in medicine. Salary £450, rising by annual increments of £25 to £550, together with the usual residential allowances.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be sent to the County Medical Officer, County Hall, Wakefield, not later than the 29th December, 1942.

CHARLES MCGRATH, Clerk of the County Council.

County Hall, Wakefield, December, 1942.

Hampshire County Council.

COUNTY COUNCIL HOSPITAL, Clayhall-road, ALVERSTOKE, GOSPORT. (60 Beds.)

Applications are invited from registered medical practitioners for the appointment of RESIDENT SURGICAL OFFICER (B1), now vacant. Applicants should have held house appointments and had surgical experience. Preference will be given to candidates holding diploma of F.R.C.S. Salary is at the rate of £550 per annum, with one month's notice on either side. R practitioners holding A or B2 posts and rejected by the R.A.M.C. may also apply.

Applications, stating age, nationality, qualifications with dates, experience, and details of previous appointments, and accompanied by copies of three recent testimonials, should be sent not later than Monday, 4th January, 1943, to—

H. LESLIE CRONK, County Medical Officer.

The Castle, Winchester.

Caernarvonshire & Anglesey Infirmary, BANGOR.

A HOUSE SURGEON and a HOUSE PHYSICIAN wanted ("A" House Appointments). Salaries respectively £160 and £140 per annum, with residence, board, and laundry. Duties to commence as soon as possible. Practitioners within three months of qualification and liable under the National Service Acts, 1939–41, may also apply, when appointment will be for six months; otherwise not exceeding one year.

Applications, stating age, qualifications, and nationality, with two testimonials, to be addressed to the SECRETARY.

Good opportunity for Medical and Surgical experience.

County Borough of Grimsby.

SCARTHO ROAD INFIRMARY. (247 Beds.) Class 1A M.S.

Applications are invited from registered medical practitioners (Male or Female) for the post of RESIDENT MEDICAL OFFICER (B1). Hospital experience essential. Salary £350–£25–£450, plus war bonus, with board, residence, and laundry. The post is a temporary one during the absence of the holder on war service, and the successful candidate will be required to be medically examined. Superannuation Act in force. R practitioners holding A or B2 posts and rejected by the R.A.M.C. may also apply.

Canvassing of members of the Council or any Committee of the Council, directly or indirectly, will disqualify the candidate for the appointment. Candidates for the appointment must, when making application, disclose in writing whether to their knowledge they are related to any member of or the holder of any senior office under the Council. Failure to do this will disqualify the candidate for the appointment.

Applications, with testimonials, to the Public Assistance Officer, Silver-street, Grimsby, not later than 29th December, 1942.

L. W. HEELER, Town Clerk.

Municipal Buildings, Grimsby, 7th December, 1942.

City of Portsmouth.

SAINT MARY'S HOSPITAL.

Applications are invited from Male registered medical practitioners for the appointment of JUNIOR RESIDENT MEDICAL OFFICER (A post), now vacant, for a period of twelve months. The salary is at the rate of £250 per annum, with full residential emoluments valued at £125 per annum, and a temporary cost-of-living bonus, at present at the rate of 6s. 6d. per week, is payable in addition to the salary. Practitioners within three months of qualification and liable under the National Service Acts, 1939–41, may also apply when appointment will be for six months only.

Application forms may be obtained from, and must be returned to, the Medical Officer of Health, Northern Secondary School, Mayfield-road, Portsmouth.

F. J. SPARKS, Town Clerk.

Municipal Offices, Royal Beach Hotel, Southsea, 8th December, 1942.

City of Plymouth.

CITY ISOLATION HOSPITAL.

RESIDENT ASSISTANT MEDICAL OFFICER (B1).

Applications are invited from registered medical practitioners (Male) for the above appointment, which is for a period of six months, mutually renewable for a further similar period, terminable by one month's notice on either side. The successful candidate will be required to work under the direction of the Medical Superintendent, and the duties are chiefly concerned with infectious and venereal diseases. He should be able to drive a car, which is provided by the Council. Salary is at the rate of £300 per annum, plus war bonus of £15 12s., with full residential emoluments. R practitioners holding A or B2 posts and rejected by the R.A.M.C. may also apply.

Applications should be sent not later than 6th January, 1943, to: T. PEIRSON, Medical Officer of Health.

Seven Trees, Lipson Road, Plymouth.

Lincoln County Hospital. (200 Beds.)

Applications are invited from registered medical practitioners, Male or Female, for the appointments of:—

HOUSE SURGEON (A), now vacant. Salary is at the rate of £175 per annum, with full residential emoluments.

HOUSE PHYSICIAN (A), vacant 1st January, 1943. Salary is at the rate of £175 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts, 1939–41, may also apply when appointments will be for six months.

Applications, stating age, nationality, qualifications, and accompanied by copies of testimonials, to—

ARTHUR MOORE, Secretary-Superintendent.

Lincoln, 4th December, 1942.

AMENDED ADVERTISEMENT.

County Borough of Bury.

Applications are invited from registered medical practitioners for the position of Whole-time DEPUTY MEDICAL OFFICER OF HEALTH (Temporary). Duties will include those at a tuberculosis dispensary, in the diagnosis and treatment of venereal disease cases, and in school medical work. Preference will be given to candidates possessing experience necessary to carry out the above-mentioned duties. Applicants must not be liable for military service. The salary will be at the rate of £750 per annum, rising to £850 per annum by annual increments of £25. The appointment will be subject to six weeks' notice on either side, and may be subject also to the provisions of the Local Government and Other Officers' Superannuation Act, 1922, for which purpose the successful candidate will be required to pass a medical examination.

Applications, accompanied by copies of not more than three recent testimonials, should be forwarded to the undersigned not later than 30th December, 1942. There is no special form of application.

H. D. A. ROBERTSON, Town Clerk.

Municipal Offices, Bank-street, Bury, 18th December, 1942.

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Coventry and Warwickshire Hospital.

Applications are invited from registered medical practitioners, Male and Female, for the appointment of a HOUSE PHYSICIAN (A), vacant on 1st February next. Salary at the rate of £150 per annum, plus £20 cost-of-living bonus, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts, 1939–41, may also apply when appointment will be for six months.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be sent immediately to—

S. CECIL HILL, House Governor and Secretary.

Cornwall Mental Hospital, Bodmin.

LOCUM TENENS MEDICAL OFFICER (B1), Male or Female, required middle January. Salary £7 7*s.* per week, plus usual residential emoluments.

R practitioners holding A or B2 posts and rejected by the R.A.M.C. may also apply.

Application to be made to the MEDICAL SUPERINTENDENT.

The Duchess of York Hospital for BABIES, MANCHESTER 19.

Applications are invited from registered medical practitioners for the post of HONORARY AURAL SURGEON. Applications, stating experience and present appointment, should be sent to the SECRETARY by 3rd January, 1943.

LOUISE GILLESPIE, Secretary.

The Lawn, Lincoln.

(Registered Hospital for Mental and Nervous Diseases.)

Applications are invited from registered medical practitioners (Male and Female) for an ASSISTANT MEDICAL OFFICER (B2), one with previous mental hospital experience preferred. Electric convulsion therapy is in use. Salary £300 per annum, with emoluments and war bonus. Practitioners qualified more than three months and liable under the National Service Acts, 1939–41 (males must be rejected by the R.A.M.C.), may also apply when appointment is limited to six months.

Apply the CHAIRMAN OF GOVERNORS, The Lawn, Lincoln.

Birmingham Accident Hospital and REHABILITATION CENTRE.

Applications are invited from registered medical practitioners, Male and Female, for the appointment of a HOUSE SURGEON (A), now vacant. Salary is at the rate of £150 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts, 1939–41, may also apply when appointment will be for six months; otherwise for twelve months.

Applications, stating full particulars, to—

A. A. MACIVER, Secretary.

Bath-row, Birmingham, 15, 3rd December, 1942.

Salisbury General Infirmary.

Applications are invited from registered medical practitioners, Male and Female, for the vacant post of HOUSE SURGEON (A). Salary is at the rate of £125 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts, 1939–41, may also apply when appointment will be for six months.

Applications, stating full particulars, to—

JOHN WILLIAMS, Superintendent and Secretary.

Grimsby and District Hospital.

Applications are invited from registered medical practitioners, Male and Female, for the post of RESIDENT CASUALTY OFFICER AND HOUSE SURGEON (A). Appointment for six months. Salary at the rate of £175 per annum, with full residential emoluments. Practitioners within three months of qualification and liable under the National Service Acts, 1939–41, may also apply.

Applications, stating age, nationality, qualifications, and copies of recent testimonials, to the SECRETARY-SUPERINTENDENT.

Barbados General Hospital.

(284 Beds.)

Wanted, a duly qualified medical practitioner as HOUSE SURGEON. Preference will be given to candidates who have had experience in administering anæsthetics. Salary £325 per annum, with quarters fully furnished for a single man, free water, lighting allowance, and no local rates. The appointment, which is renewable, will be for either three, two, or one and a half years, subject to three months' notice on either side to terminate the engagement. Candidates must state whether they wish to engage for three, two, or one and a half years. First-class single passage direct to Barbados will be paid by the Hospital Board, a proportionate part to be refunded if the term of service for which the candidate is engaged be not completed.

Applications, stating age and date of graduation, accompanied by a recent photograph, a medical certificate of physical fitness at the time of application, and recent professional and personal testimonials, should be sent by air mail to the Medical Superintendent, General Hospital, Barbados, B.W.I., from whom further particulars may be obtained. Canadian graduates must hold qualifications registrable in England. Candidates holding a United States degree must be registered in the State of New York.

By order, W. GOODMAN, Secretary.

Royal Halifax Infirmary.

Applications are invited from registered medical practitioners (Male) for six months immediately for the following appointments:—

CASUALTY OFFICER (A). Salary £150 per annum. Practitioners within three months of qualification and liable under the National Service Acts, 1939–41, may also apply.

FIRST HOUSE SURGEON (B2). Salary £200 per annum. Practitioners qualified more than three months and liable under the National Service Acts, 1939–41, but must be rejected by the R.A.M.C., may also apply.

Applications, stating age, nationality, qualifications, and accompanied by copies of testimonials, to—

11th December, 1942. A. MIDGLEY, Secretary.

Assistant Medical Officer to the LONDON PASSENGER TRANSPORT BOARD.

Applications are invited from Male registered medical practitioners for the above position. Preference will be given to applicants between the ages of thirty and fifty years. Applicants should not be eligible for war service. The appointment is whole-time, temporary for the duration of the war, and the salary £750 per annum.

Applications in writing, accompanied by copies of three recent testimonials and giving full details of qualifications and experience, should be sent to—

MEDICAL OFFICER, L.P.T.B., 280, Marylebone-road, N.W.1.

Overseas Appointments.

Two British MEDICAL OFFICERS (Men under forty years of age) are urgently required for service with large company operating in the Middle East. General and hospital work. Three years' agreement. Salary £800 per annum. Free passages out and home and kit allowance. Free furnished quarters.

Written applications, giving full details of medical education and experience, should be sent to the SECRETARY, Overseas Manpower Committee (Ref. 544), Ministry of Labour and National Service, Hanway House, Red Lion-square, London, W.C.1.

Works' Doctor required for a large factory in the London area employing several thousands. It is essential that applicant should have had the requisite experience as a Works' Doctor in industry. Age between 40–50. Salary according to industrial experience, from £800 to £1000.—Apply, giving full particulars, to Address No. 951, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Applications are invited for part-time appointment of Female MEDICAL OFFICER to Midlands firm. Salary £350 to £400 per annum, all found. Duties light.—Write full particulars, A. SHAW, Medical Transfer Agency, Premier Buildings, 88, Church-street, Liverpool, 1.

Medical Copywriter. — A vacancy occurs in a large firm of Manufacturing Chemists of international reputation for a Medical Copywriter. Work would comprise compilation of instruction leaflets and some advertisements in the medical press. Preference would be given to applicants who have had previous experience of this or closely similar work. Specimens (which will be returned in due course) should be included with application, together with particulars of qualifications, past work, age, liability for military service, and salary expected.—Address, No. 958, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Wanted, duration, Locum for mixed practice in rural district, West Wales.—Address, No. 957, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Wanted, duration, Locum, Male, out-door, S.W. Coast Town. Salary £500. Private and Panel Practice.—Address, No. 956, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Wanted, for duration of war, Man or Woman ASSISTANT for General Practice in Leicester.—Address, No. 955, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Duration Assistant wanted imme-diately, Cheshire. Mixed good-class Practice. £500 per annum, plus bonus, and car or car allowance.—Apply, MELLOR, SNAPE & Co., Chartered Accountants, 130, Nantwich-road, Crewe.

Examination Couch in Dark Oak, stuffed-over top in pegamoid with ratchet-rising head; on pedestals containing five large drawers and pull-out shelf. As new, £18 18*s.* View Thames Ditton.—Write BM/MDTR, London, W.C.1.

Anglesey.—Private and Panel Practice for immediate Sale owing to death.—Address, No. 959, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Harley Street and District.—A number of excellent CONSULTING ROOMS are available for full and part-time use at moderate rents. Particulars on application.—ELGOOD & Co., 1 Bentinck-street, Welbeck-street, W.1. Welbeck 8974.

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